amateur radio

SPECIAL – 65th ANNIVERSARY ISSUE

VOL. 43, No. 12 DECEMBER, 1975

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COVER PHOTO

Amateur radio has come a long way since the WIA was founded in 1910. We now have news broadcasts on TV. Tom VK7TM and Brian VK7RR check the program before the first TV news broadcast. See story on p.5.

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

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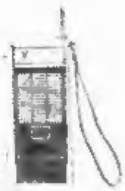

SPECIFICATIONS, NC-310

Transistors: 13
Channel Number: 3, 27.24 OMHz Citz. Band
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$1.50 Postage.

The Management and Staff of HAM RADIO SUPPLIERS would like to extend SEASONS GREETINGS to readers of 'Amateur Radio" and also wish you a HAPPY AND PROSPEROUS 1976.

amateur radio

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QSP

COUNTING OUR BLESSINGS

Despite inflation and a whole host of problems the Institute is very much a going concern.

We are proud in having one of the best amateur radio journals in the world.

Our membership is on the increase. Not as much as we would like but nevertheless it is increasing.

At the Federal level there has been intense activity during the year. Several benefits have been secured for amateur radio in Australia as a whole and more are under negotiation.

Your watchdogs are keen and active. The many volunteers managing your affairs at the various levels are by and large deep thinking, hard working, and blessed with much common sense and sound judgement based upon a wide knowledge of amateur affairs.

Sure, there is scope for improvement. This can only happen if members, or groups of members, communicate their problems. If any cause is right, and if enough members keep pushing for it, something good will eventuate. Your administrators of amateur radio cannot work in a vacuum. They need to know about problems. Despite a very high volume of trivia and routine matters which cannot be ignored, there is an amazing number of important items which get extensive consideration and for which positive action is initiated. There is a very real grading of priorities, a very real feeling of facing facts.

There is ample scope for the views of minorities to be discussed. In all organisations there are people who single-mindedly exert immense pressures to have their own (frequently parochial) views adopted for one reason or another. This Institute is no exception. As often as not these people spoil their own cases by over-emphasis and extremes of pressure. Sometimes their efforts prove harmful to the public image of amateur radio particularly if the media becomes involved.

Fortunately the backbone of amateur radio is based on good sense and tolerance.

Fortunately we can count our blessings in possessing great stores of these commodities. Even if they do remain silent or apparently silent.

We need all the backing we can get for the years ahead — especially WARC 1979. Happily there is now a great awareness in amateur ranks of what WARC 1979 could do to us. Happily we are not alone in the world. We support the IARU and it supports us.

Count your blessings that amateur radio world-wide is alert to the dangers ahead. We do not intend amateur radio to fizzle out as a spent force. Preparations to join battle are progressing well. With the full support of every amateur we can emerge triumphant into the closing decades of this century.

A Very Merry Christmas and Prosperous New Year to you all.

D. A. WARDLAW VK3ADW, Federal President ■

EXECUTIVE OFFICE

The Executive Office will not be open between Christmas Day and 19th January 1976. Mail business as usual, however.

SUBSCRIPTIONS

Some members are asking why should they have to send their subscription payments to the Executive Office in Melbourne. "Why can't we pay our Division?" they ask. The answer is quite simple — centralised accounting to save money. Our EDP system calculates the subscriptions payable and prints out the notices ready for enveloping and posting. It also takes care of address changes and the printing of the AR address labels each month so that all the address changes go through into all the systems including subscription notices at the specified date. The EDP also automatically does a number of other things including a call book listing, listings by post codes as well as the accounting area. Details of all payments received go into the computer on the subscription notices which you return with your payment so that firstly you will continue to receive AR and will not have your address label suppressed because of being unfinancial, and secondly your computer records will be ready for the following years subscription listing. As a result of all this the Divisions no longer have to calculate, write out, despatch and record subscription details because the Executive office is geared to handle all this on a bulk basis. If temptation proves too great and you happen to pay into your Division this only introduces complications, possible delays, double handling and extra accounting and other work for which the Division might find it difficult to cope. The centralised system is working pretty well so please comply with the instructions printed on the subscription notice and **PLEASE REMEMBER** that this year because of the increased postal charges your subscription notice could well be endorsed **"FIRST AND FINAL NOTICE".** It will therefore be better to pay early and avoid the disappointment of being automatically removed from the listings because of being unfinancial. And finally a reminder that if you need a receipt please ask for one and send a SASE with your request. Always make sure you cross all cheques etc. because in past years a few have gone astray in the mail. If you do not receive April AR this is usually an indicator of something having gone wrong. ■

DARWIN APPEAL

As stated on p.3 of AR for Aug. '75 the Darwin Appeal has now closed. The donation of $600 shown as from the Geelong Hamfest Society in fact derived from a social function excellently supported by the amateurs in the area and further afield.

The total amount collected amounts to $1084.38. The previous total as published was augmented by the following donations:—

VK2AKY	$10.00
VK2 Division	$100.00
VK3AT	$10.00

The question of the disposal of this Fund has been under active discussions and investigation. A result of which, the Executive, on the advice of the

WIANEWS

At the time of writing it is known that everything is ready for the Novice Licensing Exam due to be held on the third Tuesday in November. Whether or not the examination can in fact be held is unknown since no news has come to hand that the industrial dispute has been settled.

Criticisms have been levelled at the Institute that the tenure of the Novice Licence to two years was a deep dark plot laid by those in charge of Institute affairs. It appears to be alleged that this fact was hidden from the membership.

Readers are requested to turn to page 7 of AR for May 1973 as a starting point. The penultimate paragraph in the letter reproduced on that page is self-explanatory. This letter arose out of negotiations with the PMG's Department conducted by the Executive following the mandate given at the 1972 Federal Convention.

The 1972 Federal Convention crystalised thinking in relation to Novice Licensing, a subject which had been under discussion since the 1950's and which had finally led to the commissioning of an investigation into the matter late in 1970 and early in 1971. The investigation was carried out by a committee under the chairmanship of Mr. Rex Black, VK2YA and a lengthy Report containing this committee's deliberations and recommendations had been submitted a few days prior to the 1971 Federal Convention — so late that the Convention considered such an important matter could not receive that amount of close study and informed discussion that it rightly deserved — hence the delayed decision.

It is interesting to observe that the Novice Licensing Investigation Committee's Report specifically stated "That Novice Licences should be issued on the basis of LIMITED TENURE". The commentary on this recommendation read:—

"It is suggested that applicants for Novice Licences should be permitted to hold the original licence for one year with provision for renewal for a limited period only, except in exceptional cases in which special reasons for further renewal would be subject to consideration by the Licensing authority; the principle of the Novice Licence concept is based on its being an introductory form of transmitting permit, another avenue of entry into the Amateur Service, another means whereby enthusiasts may proceed to AOCP status. The Novice Licence should NOT be regarded as an end in itself but merely the first step towards qualified amateur operator level. This principle follows the American pattern and is strongly supported by the opinion survey conducted by this Committee. In America the tenure period is two years. Formerly it was 12 months only, but the increased period was introduced in 1968. Under the original one-year tenure period it was found that 50 to 60 per cent of Novices proceeded to General Class, which equates to the Australian AOCP. No figures are yet available to show the effects of the two year tenure period".

Although all systems are go there are still no Novice licences in existence with their 3 letter "N" calls.

Equally, nothing has come forward from any of the Divisions of the Institute to discuss any alterations to the Novice Licensing arrangements let alone proposing any amendments to the conditions.

It is interesting to observe that discussions are proceeding at the present time to formulate a 'gentleman's agreement' on band sharing as exists for the HF bands as separating phone and CW segments of the bands. Since Novices would be able to use telephony as well as telegraphy and since a part of each segment in two out of the three HF bands allowed to Novices is within the CW portions of those bands it is obvious that band sharing arrangements are necessary to avoid chaos both for the Novices and other users as well. A decision on this must emanate from the Federal Council but it would not ordinarily be necessary for this to lie dormant until the next Federal Convention in May 1976.

During October the Federal President held discussions with the Secretary to the PMG's Department together with Mr. H. Young Assistant Secretary of the Radio Frequency Management Branch of the Department.

High on the list of items discussed was the Institute's request for proper representation in all areas affecting the amateur service leading up to, and at, WARC 1979. It was understood that Australia is beginning to swing into action for this important conference and strong submissions for the amateur service to be involved were noted by the officials. Many will remember that after enormous efforts the late Mr. John Moyle was officially appointed as an amateur observer with accreditation as a member of the official Australian delegation to WARC 1959 at Geneva.

Other matters brought up by the Federal President included representation on any frequency management or planning committee, an active interest in any impending legislation affecting the amateur service, arrangements for future call books, examinations in considerable depth in relation to all the various problems which arise, Intruder Watch follow up, reduced licence fees for pensioners and disabled persons, and delays in obtaining replies on amateur matters.

Immediate answers to all these matters cannot be expected. However, these are things of prime importance and no lack of follow-up action will occur. ■

W.I.A. South Australian Divisional Council propose to inform the Darwin Amateur Radio Club that the monies collected for the Darwin Appeal Fund will be made available for the establishment of the most suitable radio installation for the Club subject to proper accounting for the monies expended.

1976 SUBSCRIPTION RATES

At the time of writing (late Oct.) all the rates are not yet known. Here is a list of those that are known:—

Div.		$
VK1	One rate	20.00
VK2	Full member	$20.00
	Associates	$18.00
	Pensioners	$10.00
	Students	$10.00
	Family members	$10.00
VK3	Full members	22.00
	Associates	19.50
	Students	13.00
	Pensioners	13.00
VK4	Full city	20.00
	Full country	18.50
	Assoc. city	20.00
	Assoc. country	18.50
	Pensioners	13.00
	Student grade discontinued	
VK5	Full central	20.50
	Full country	19.00
	Assoc. central	19.00
	Assoc. country	19.00
	Students	9.00
	Pensioners	9.00
	Jr. student	2.00
VK6	Full	20.00
	Associate	19.00
	Pensioners	12.00
	Students	12.00
VK7	Full	17.00
	Associates	17.00
	Students	10.00
	Pensioners	10.00

Joining fees

VK2		$2.00
VK7		1.00
	Federal dues for 1976	14.50
	(AR 7.20, IARU 0.30, other 7.00)	
	(The full dues are levied against all full and Associate members)	

1ST JOTA CONFERENCE

The Report of the first Jamboree-on-the-air Conference was held in Lillehammer, Norway as part of the 14th World Jamboree on 1/8/1975. About 60 delegates from 22 countries attended the formal sessions under the joint chairmanship of Les Mitchell, G3BHK and Len Jarrett, HB9AMS. In his historical review G3BHK said JOTA began in 1958 although many earlier ties between the two interests had occurred going back to 1912. Radio Scouting, he said, grew out of JOTA and several Scout Associations had incorporated radio into Scout activities including fox hunting and kit building. One of the problems was that few, if any, JOTA stations were heard from the developing countries yet these countries were the very ones clamouring for more and more commercial frequency space. As they usually had no national amateur radio organisation they fully supported any international move to reduce the bandwidths available to amateurs. Amongst other items the Conference felt the need for a Scout Radio Handbook containing material about radio scouting not available elsewhere.

PR WORK

"Awareness — specifically, the public's awareness of amateur radio — will play a large part in the future of amateur radio. In today's world of political realities, a concerted effort is needed to aggressively boost the image of amateur radio in the public's eye". Opening remarks of editorial, August '75 QST.

MULTI-CHOICE EXAMS

Aug. '75 QST contains information that the Canadian Dept. of Communications have introduced new multiple choice type examinations for prospective Canadian amateur and advanced amateur radio class operators.

PROVOCATION OF THE MONTH

Nobody under 30 reads AR. ■

THE FIRST WIA SUNDAY BROADCAST ON ATV

A BLOW BY BLOW DESCRIPTION

Tom Moffat, VK7TM
7 Shannuk Dr., West Hobart, 7000

On Sunday morning, October 5, 1975, the VK7 Wireless Institute Southern Branch transmitted what is believed to be the first ever divisional broadcast on Amateur Television. Here's how it came about:

May, 1975:
The idea germinates. Over the past several months Tom VK7TM had built up an ATV transmitter. It worked very nicely, but there was one problem — nobody to work on ATV in Hobart. Winston VK7EM, had been on ATV from the Northwest Coast, along with Tony VK7AX; and a few others had ATV transmitters under construction. But they are not within UHF range of Hobart, and several mountain ranges separate us.

In an effort to stir up some ATV activity in Southern Tasmania, the WIA Disposals group, under Andrew VK7AW, put up about 20 ATV converter kits and started selling them around Hobart. We were soon at the stage of having 20 receiving stations but still only one transmitting station. So the idea was born: why not start transmitting the weekly WIA broadcast on ATV, in the hope of encouraging more general activity on ATV?

The Tasmanian Division, WIA, duly dispatched a letter to the PMG Radio Branch, asking that the UHF TV channel be added to the list of WIA broadcast frequencies.

Response was not immediate. Apparently no one had proposed running a Sunday broadcast on ATV before, in any part of Australia. We were going to be first, so we kept quiet about it, and waited.

Sept. 11, 1975:
We are told approval for the ATV broadcast is granted. This is an unexpected surprise. In Tasmania the Sunday broadcast origination point rotates around the state on a three week cycle — one week Hobart, the next Launceston, the next Devonport or Ulverston, and then back to Hobart. Hobart's next turn is Sept. 14, only three days away. We will never make that — VK7TM's TV transmitter is in 10 pieces after some unsuccessful modifications. It is decided to set the target date for three weeks further on — October 5.

Sept. 29:
The ATV transmitter is now back together and working nicely, but we have discovered another problem. As well as broadcasting on ATV, we have to provide a service on 80 metres to parts of the state out of range of our UHF ATV. But 80 metre SSB coming from the same shack as ATV works its way up the camera cable and modulates the ATV transmitter. It is right in the middle of the video passband. So the 80 metre transmission has to come from somewhere else.

Andrew VK7AW, was in on the planning of this broadcast from the start. He was going to be the original announcer. But a few days ago his wife Judy presented him with a baby boy, their first.

So we had decided to keep out of Andrew's hair, and leave him to his nappy changing. But now he is needed, badly. He has a good 80 metre SSB transmitter and an ATV converter. We plan to broadcast from VK7TM on ATV only, get Andrew to pick it up off air, patch the speaker of his TV set to the audio input of the SSB rig, and re-transmit the audio.

This sounds like an easy thing to do, but in this case it will not work. There is a big hill between the VK7TM and VK7AW QTH's, and our 15 watts of ATV just won't penetrate it. Andrew gave his converter a good tweak and crawled all over the roof of his house trying different aerial positions. But all he got was a very snowy picture and noisy sound, not fit for re-broadcast. The path just was not there.

Sept. 30:
Brian VK7RR, has volunteered to be the 'newsreader' in place of Andrew. Tonight we are going to try a dry run. First we have to set up some big TV studio lights that mysteriously turned up during the week. Then we set Brian in the 'hot seat' and hit him with a couple of thousand watts of light. As he sits and roasts under the lights we juggle the light positions, his seating position, and camera angles to try to get a professional effect. Satisfied, we shut the whole lot down and retire to Tom's lounge room for coffee, and to discuss how we are going to achieve that 80 metre re-broadcast now that the test with VK7AW has failed.

Oct. 1:
The night of the W.I.A. Branch meeting at the Prince of Wales Hotel, Hobart. Still nobody to do the 80 metre re-broadcast. Sitting at the other end of our table is Peter VK7PS, with his hand wrapped around a glass of beer. Now there is a possibility — he has got an ATV converter and can transmit 80 metre SSB. We put the hard word on him and he agrees to give it a try. So we set up a test later in the week to check the ATV path.

Oct. 3:
Peter lives on Mt. Nelson, and has a near line-of-sight path to VK7TM. He receives the ATV picture and sound virtually noise free. His 80 metre SSB is good and clean and doesn't interfere with the ATV reception. Peter says he will arrange a TV to

SSB audio patch, to try out the next day. We shut down for the night.

Oct. 4:
Peter has constructed a TV set to SSB rig patch, complete with level adjustment and equalisation. He hooks it up, we give a test call on ATV, and he re-broadcasts on 80. We receive it off 80 and record it on a casette. On playback it sounds tremendous. Peter has done a good job, and one more worry is over. Then Peter announces he may have to work on Sunday morning and may not be able to get home to operate his equipment. Panic again.

Oct. 5, 0800 AM:
The Big Day. Turn all VK7TM equipment on for a final test. No smoke, everything looks OK. Pace up and down for a while, have another cup of coffee.

0830 AM:
Brian VK7RR, is supposed to be here, but he is not. Call him on two metres Channel B. No answer, but Mike VK7FB, comes up. He will do the Hobart relay on Channel B and 52.525. We ask him to advise listeners that we will begin transmitting ATV test pattern at 0900 for final converter tweaking.

0845 AM:
Call Peter VK7PS, our 80 metre relay. He doesn't answer, so he must be working. This means our 80 metre relay, the link with the rest of the VK7WI network, has fallen through. It looks like we will have to scrub the ATV for the week and originate on 80 ourselves, voice only.

0850:
"VK7PS listening Channel B". He is on the way home, taking an early 'lunch break'. We have got our 80 metre relay back again. Another crisis over.

0855:
VK7AX calls on 80 with some last minute news from the North. We ask him to hang on for a few minutes, Brian is on the way and will take it himself, since he is the one who will be reading it.

0857:
VK7RR arrives. He climbs over all the camera and audio cables to the 80 metre rig to talk to Tony. Just as he is getting seated his foot catches the mic cable, pulling the whole ATV transmitter off the bench. It is left dangling by its power cable. Disaster again. But not quite — a quick check-out proves it is still working O.K.

0900:
Brian calls Tony on 80 metres. At the same time we hit the switch putting the ATV test pattern on air. A loud buzz comes from the 80 metre rig — the ATV is overloading it. We kill the ATV again and ask VK7FB to announce that the test pattern will be slightly delayed.

0905:
Brian and Tony are finished, so we fire up the test pattern. Brian moves into the 'hot seat' and once again we check lighting. There is a bit of flare coming off Brian's forehead, so his wife Sue moves in with some make-up. She smears his face with cream, followed by brown facial powder. Brian's not too happy about this, until we remind him that it is common practice in every TV studio.

0915:
The make-up is finished, and Brian is going over his notes. Tom is going over the transmitter yet again, and finds the linear is getting hot. He arranges a tangi heater set to 'cool' to direct its air flow on the linear's heatsink and all is well. Test pattern looks good coming off air.

0920:
Peter VK7PS, advises all his gear is running and asks for a sound test. We plug in the microphone, get Brian to count, and Peter patches it through to 80. Mike, VK7FB, takes the cue and patches 80 through to the VHF network. This results in great squeals of feedback from the VHF rigs in the 'studio'. We are lucky we tested it before VK7WI 'officially' went to air. Anyhow, everything works.

0927:
Checklist — Lights on, vision on, transmitter on, blower on, sound off, VHF rig speakers off, all kids, dogs, etc. out of shack. Everybody ready? Yes!

09:29; 45:
Fade test pattern to black. Tell Brian to stand by. Sue removes the test pattern and stand while Tom wheels the camera back into position for the opening shot. Turn sound on.

0930:
Fade up picture and cue Brian. Picture is out of focus and Brian looks a bit startled. But Australia's first W.I.A. broadcast on TV is underway.

0935:
Brian's initial nervousness is gone, the camera is back in focus, and everything looks good. We forgot to start the audio casette recorder on the 80 metre receiver. Missed the first five minutes. But now it is running.

Brian has got through the opening remarks and a few meeting announcements, and launches into a report on the history of WIA broadcasts in VK7. We did not know he was going to do this. It is a bit of a surprise but it sounds tremendous and certainly fits the occasion. And he is not even looking at his notes. He has memorised the whole thing and delivers it looking straight into the camera.

0940:
Brian's going so well we must do something to make the production match the content. So we try a few tracking shots — wheeling the camera closer and further from him to give a variety of aspects. But the floor is uneven and each time the camera is moved it looks like our 'studio' is hit by an earthquake. As well the wheels squeak.

0945:
Time for a few photographs. Tom grabs the film camera and shoots off a whole roll of film, of the whole set-up, from all angles.

0959:
Brian is finishing up. Perhaps we will try one more spectacular camera shot. As Brian closes, Tom pulls the camera back to get a wide shot of the whole studio. But the camera rolls over his foot causing another 'earthquake'. The camera ends up pointing at the ceiling, so there's nothing left to do but fade out and be done with it.

1000:
Cut the main power switch to the transmitter, and breathe a sigh of relief. Now to take the callback on 80 metres and see what they thought of us.

The Result:
The callback indicates we had about four TV viewers, which is better than nothing. We had more than the usual number of listeners to the re-broadcast on 80 metres and VHF. Most commented on Brian's ability to produce something different (the historical report) and wanted to hear more of the same.

The Future:
Now that we are over the initial hurdle, we hope to produce most broadcasts originating in Hobart on ATV. This might not be possible, since a lot more people are involved in a TV broadcast than in a voice-only version. Hopefully the Oct. 5 effort will cause a few more people to get their converters going, increasing our viewing audience considerably. Although we had expected no opposition from the 'professional' TV stations, they must have heard what we were up to, because for the first time this year a commercial TV station was on at 0930 in the morning, carrying the Bathurst 1000 motor race. They probably got a few more viewers, because they've got colour, and we haven't. (Yet).

The Equipment:
Camera: Ikigami vidicon camera type VR621.
Microphone: Electrovoice studio type.
Lighting: Mole-Richardson variable spot-flood.
Transmitter: 10 mW exciter, sound and vision, solid state, similar to one described in VHF Communications, Feb. and May, 1973.
Linear: Four stage, solid state, 15 watts average power output.
Aerial: Discone (AR April, 1973).
Frequencies:
Vision carrier 426.25 MHz.
Sound carrier 431.75 MHz. ■

Afterthoughts

A simplified method of morse code generation . . . October, page 20.

(i) Q3 is *not* a BC107 as was labelled in the schematic but is a 2N4249, which is a P.N.P., and should be connected with collector to the key terminal, and emitter to +5.

This will only handle a key-open voltage of 60 volts, which is ample for the transmitter it was used on (FLDX400). If a transmitter with a higher key-open voltage is keyed, a higher voltage transistor is necessary, or a shunting resistor must be used to reduce the open-key voltage.

(ii) The type of U2 is not mentioned — for the circuit shown, the extendable hex inverter Fairchild 9935 was used. The other manufacturers have equivalents.

The use of a DTL device among TTL's is a bit odd, but there is no functional equivalent in TTL. ■

RAC ANTENNA BY VICOM

Now appears in a completely new style

LOADED DIPOLE

AL-48DXN and AL-24DXN

Equipped with the new traps that combine the merits of linear loading and colinear loading.

Wire and wire locks ... 52S type
Hardware (screws, nuts, washers) ... stainless steel

New Deluxe series, designed for easy installation rather than for additional shortening.
Almost no need of adjustment for any band. May be mounted in non-standard configuration.

Midy-V N

Model	Description	Impedance	Freq.	Power	VSWR	Overall Length	Net Weight
AL-48DXN	New Deluxe type, Duoband Loaded Dipole	52 ohm	3.5, 7MHz	2KW PEP 1KW CW	Less than 1.2/±80KHz	28m	1.2Kg
AL-24DXN		52 ohm	7, 14MHz	do	do	14m	900g
AL-15DXN		52 ohm	21, 28MHz	do	do	6m	870g
Midy-II N	New Deluxe type, Multi-band Loaded Dipole	52 ohm	3.5, 7, 14MHz	1.5KW PEP 750W CW	Less than 1.3/±50Hz	23m	1.4Kg
Midy-III N		52 ohm	7 ~ 28MHz	2KW PEP 1KW CW	do	14m	1.4Kg
Midy-V N		52 ohm	3.5 ~ 28MHz	1.5KW PEP 750W CW	do	23m	2.2Kg

ANTENNA STYLES NEW DELUX TYPE

AL-15DXN
AL-48DXN, AL-24DXN

Midy-II N

Midy-III N

Midy-V N

CENTER-LOADED DIPOLE

By the use of center loading coils the length of the antenna is shortened to 55% at 3.5MHz and to 60% at 7MHz. Being center loaded, it suffers less influence of adjacent metalic objects than other types of antennas.

A-8VPN

Model	Description	Impedance	Freq.	Power	VSWR	Overall Length	Net Weight
A-4VPN	Center-loaded Dipole	52 ohm	7MHz	600W PEP 300W CW	Less than 1.2/±38KHz	12m	570g
A-8VPN		52 ohm	3.5MHz	do	do	22m	800g

COAXIAL SWITCHES

Model	Description	Impedance	Freq.	Power	VSWR	Dimensions	Net Weight
CX-2A(A)	Coaxial Switch	52 ohm	Up to 300MHz	500W PEP 250W CW	Less than 1.3/170MHz	80x60x40mm	250g
CX-2A(B)		75 ohm	do	do	do		
CX-6A(A)		52 ohm	Up to 500MHz	1.5KW PEP	Less than 1.3/400MHz	(round) 85x70mm	
CX-6A(B)		75 ohm	do	do	do		

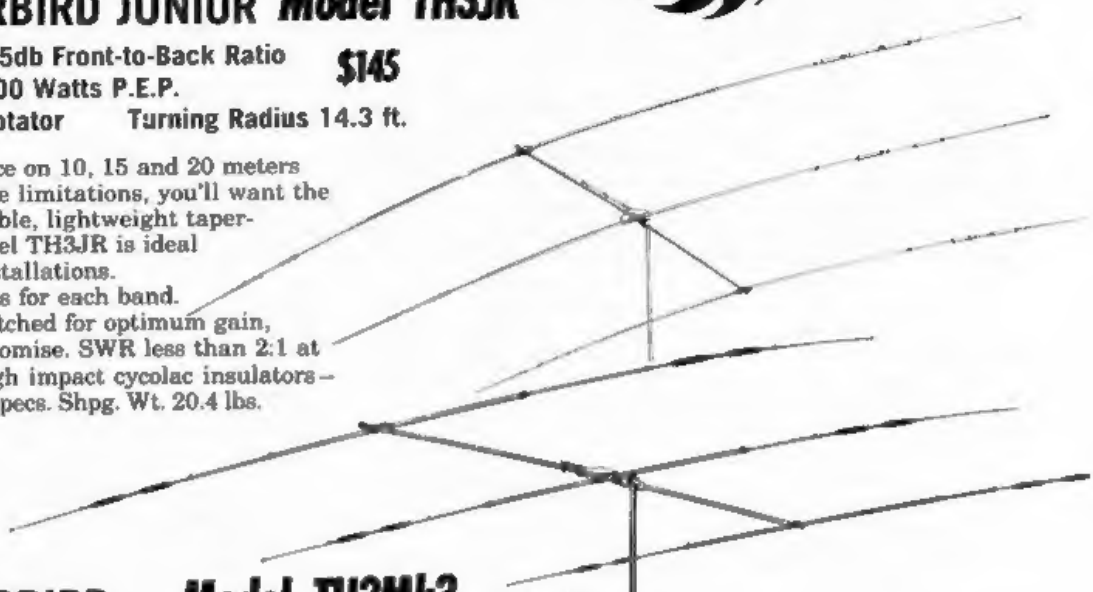
hy-gain Antennas!

AVAILABLE FROM STOCK

FABULOUS THUNDERBIRD JUNIOR *Model TH3JR*

Up to 8db Forward Gain 25db Front-to-Back Ratio $145
Takes up to 300 Watts AM; 600 Watts P.E.P.
Rotates with Heavy Duty TV Rotator Turning Radius 14.3 ft.

If you're looking for top performance on 10, 15 and 20 meters but are hampered with severe space limitations, you'll want the Model TH3JR. Constructed of durable, lightweight taper-swaged aluminum tubing, the Model TH3JR is ideal for rooftop or lightweight tower installations. Separate and matched "Hy-Q" traps for each band. Feeds with 52 ohm coax – Beta Matched for optimum gain, maximum F/B ratio without compromise. SWR less than 2:1 at resonance on all bands. Molded high impact cycolac insulators – all hardware iridite treated to MIL specs. Shpg. Wt. 20.4 lbs.



NEW, IMPROVED SUPER 3-Element THUNDERBIRD *Model TH3Mk3* $190

New "Hy-Q" Traps Up to 8db Forward Gain 25db Front-to-Back Ratio
Takes Maximum Legal Power

Delivers outstanding performance on 10, 15 and 20 meters. Separate and matched "Hy-Q" Traps for each band. Feeds with 52 ohm coax. Hy-Gain Beta Match presents tapered impedance which provides most efficient 3 band matching and provides DC ground to eliminate precipitation static resulting in maximum F/B ratio, SWR less than 2:1 at resonance on all bands. Mechanically superior construction features taper swaged slotted tubing allowing easy adjustment and permitting larger diameter where it counts. Has heavy tiltable boom to mast clamp. Shpg. Wt. 35.9 lbs.

MECHANICAL

Longest Element	27 ft.
Boom Length	14 ft.
Turning Radius	15.7 ft.
Wind Load At 80 MPH	103.7 lbs.
Maximum Wind Survival	100 MPH
Net Weight	36 lbs.
Mast Diameter	1¼" to 2½"
Surface Area	4.03 sq. ft.

TH6DXX $240

No other antenna gives you the performance on 10, 15 and 20 meters equal to that of the Thunderbird. Built, without compromise, to be electrically and mechanically superior to everything else.

- Separate "Hy-Q" traps for each band. Tuned at the factory for peak performance. Get optimum results for your preferred mode on transmission, phone or CW, using factory supplied charts.
- Cast aluminum, tilt-head, boom-to-mast bracket accommodates masts from 1¼" to 2½" and provides mast feed-through for stacking. (Extra heavy gauge, formed element-to-boom brackets used throughout.)
- All taper-swaged, slotted aluminum tubing for easy adjustment, lightweight, with full circumference, compression clamps instead of usual self-tapping screws used throughout.
- Exclusive Beta Match for optimum matching on all three bands and positive DC ground path.
- 3 active elements on 20 and 15 meters, 4 on 10.
- 25 db front-to-back ratio.
- SWR less than 1.5:1 on all bands at resonance.
- 24' boom, longest in the industry.
- 20' turning radius, 6.1 sq. ft. surface area, 61.5 lbs. net weight.

ELECTRICAL SPECIFICATIONS

Frequency Range	20, 15 and 10 Meters
Gain	8.7db (average)
Front-to-Back Ratio	25db
Maximum Power Input	1 kw AM; 2 kw P.E.P.
VSWR (at resonance)	1.5:1
Impedance	50 ohms

MECHANICAL SPECIFICATIONS

Longest Element	31.1 ft.
Boom Length	24 ft.
Turning Radius	20 ft.
Wind Load at 80 MPH	156 lbs.
Maximum Wind Survival	100 MPH
Net Weight	61.5 lbs.
Mast Diameter	1¼" to 2½"
Boom Diameter	2"
Surface Area	6.1 sq. ft.

10-15-20

The ultimate Tri-band

DON'T LET ITS SMALL SIZE FOOL YOU. The Atlas transceiver is packed full of the most advanced, state-of-the-art engineering, and provides unequaled performance in both transmit and receive modes. There is no other transceiver on the market with as many outstanding superior features, regardless of size.

SEVEN POUNDS OF DYNAMITE!

NEW ATLAS 210x/215x SPECIFICATIONS

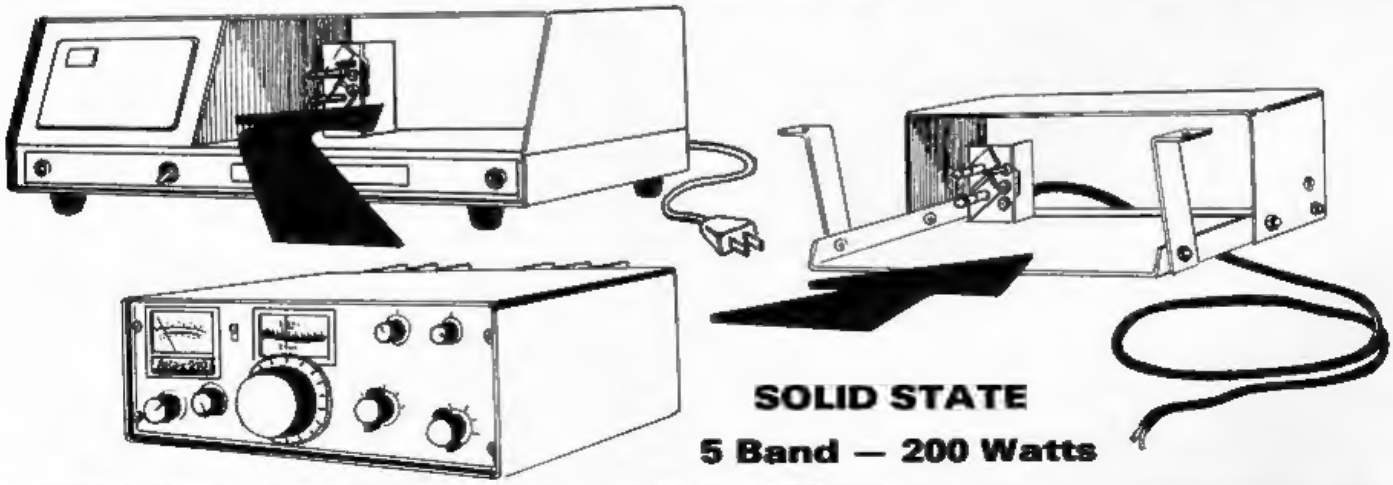
GENERAL: Frequency Coverage with Internal VFO: 1800-2000 kHz, (Model 215x only), 3500-4000 kHz, 7000-7500 kHz, 14,000-14,500 kHz, 21,000-21,500 kHz, 28,400-29,400 kHz, (Model 210x only). **Note** that the 10 meter band may be easily owner adjusted to cover any 1000 kHz segment. **Frequency Control:** Highly stable VFO common to both receive and transmit modes. Tuning dial calibrated in 5 kHz increments with 1 kHz increments on skirt of tuning knob, except on 10 meters where increments are 10 kHz and 2 kHz, respectively. Tuning rate is 22 kHz per revolution. **Frequency Stability:** Less than 1 kHz drift during first 30 min. (2kHz max. on 10 meters). Less than 300 Hz per hour after 30 min. Less than 100 Hz shift from 11 to 14 volts supply. **External Frequency Control:** Rear socket provides for plug-in of external VFO or crystal oscillator for separate control of transmit and receive frequencies, or for network and MARS operation. **Frequency Coverage with Crystal Oscillator:** (1800-3000 kHz, model 215x only), 3300-4600 kHz, 6900-8000 kHz, 13,800-14,900 kHz, 20,600-21,600 kHz, 27,500-30,000 kHz, (Model 210x only). **Completely Solid State:** Includes 4 I.C.'s, 18 transistors, 32 diodes. **Modes of Operation:** SSB with selectable sideband, and CW. Normal sideband position is LSB on 160, 80, and 40 meters, USB on 20, 15, and 10 meters. Automatic off-set frequency on CW transmit. **Modular Construction:** Plug-in PC boards for R.F., I.F., and audio circuits. **Plug-in Design:** Rear connectors are designed so transceiver plugs into Mobile Mounting Bracket, or AC Console. Connectors are standard: SO-239 coax. antenna jack, 1/4 in. diam. 3 circ. jacks for Mic. and external speaker or headphones, 1/4 in. diam. 2 circ. jack for CW key, 9 pin Noval sockets for Ext. Osc. and Aux. Linear control. **Power Supply Requirements:** 12-14 volts D.C., negative ground only. Terminal P1 is high current circuit for power amplifier, 16 amps. peak in transmit mode. Terminal P2 is low current circuit for receiver and low level stages, draws 300 to 600 ma. in rec. and trans. modes. **Finish:** Vinyl covered aluminum cabinet, black. Anodized aluminum panel. **Dimensions:** 9½ in. (24.1 cm) wide, 3½ in. (8.9 cm) high, 9½ in. (24.1 cm) deep. **Weight:** 6 lbs. 14 oz. (3.1 kg) net. 8 lbs. 6 oz. (3.8 kg) shipping.

MODEL 210x or 215x With Noise Blanker $695

RECEIVER SPECIFICATIONS: Circuit Design: Direct conversion of signal to 5520 KHz I.F. using double balanced diode ring mixer, providing exceptional immunity to overload and cross modulation. **Sensitivity:** Requires less than 0.4 microvolts for 10 db signal-plus-noise to noise ratio, 160 through 15 meters. Less than 0.6 microvolts on 10 meters. **Selectivity:** Crystal ladder 8 pole filter. Bandwidth: 2700 Hz at 6 db down, 4300 Hz at 60 db, and only 9200 Hz at 120 db. Ultimate rejection greater than 130 db. 1.6 shape factor. **Image Rejection:** Better than 60 db. **Internal Spurious:** Less than equivalent 2 microvolt signal. **AGC:** Audio output constant within 4 db with signal variation from 5 microvolts to more than 3 volts. **Overall Gain:** Less than 1 microvolt for 0.5 watts audio output. (CW carrier, 1000 Hz heterodyne.) **Audio Output:** 2 watts at 10% distortion, 300 to 3000 Hertz, plus or minus 3 db. **Internal Speaker:** 3 in., 4 ohm, .68 oz. magnet. Rear jack permits plug-in of external speaker or low impedance headphones. AC console automatically disconnects internal speaker and connects front facing speaker. Plug-in Mobile Mount provides for automatic connection of external speaker if desired. **Meter:** Reads "S" units from 1 to 9, plus 10 to 50 db. **Calibrator:** Provides calibration markers at 100 KHz increments on tuning dial. **Dial Set:** Permits adjustment of dial scale calibration.

TRANSMITTER SPECIFICATIONS: Circuit Design: Broadband design eliminates transmitter tuning. Single conversion produces minimum spurious mixing products. 2 section low-pass filters on each band provide excellent harmonic and TVI suppression. ALC with panel adjustment. Infinite SWR protection. **Frequency Control:** Internal VFO automatically transmits exactly on receive frequency. Rear socket provides for plug-in of external VFO or crystal oscillator accessory, (Model 10-X), for separate control of transmit and receive frequencies, or for network and MARS operation. **Power Rating:** 200 watts P.E.P. input, and CW input, (50 ohm nonreactive load, and **13.6 DC** supply voltage) 160 through 15 meters. 120 watts on 10 meters. **Power Output:** 80 watts minimum P.E.P., and CW on 160 through 15 meters. 50 watts min. on 10 meters. **Note:** Ratings are at 13.6 DC volts to transceiver at full load. **RTTY/SSTV Power Rating:** Approx. 90 watts input, depending on heat sink ventilation. Small fan recommended. **Unwanted Sideband:** More than 60 db down at 1000 Hz audio input. **Carrier Suppression:** More than 50 db down. **Third Order Distortion:** Approx. 30 db below peak power. **Harmonic Output:** More than 35 db below peak power. **CW Transmit:** Manual send-receive. Semi-break-in with CW accessory installed in AC console. Automatic off-set transmit freq. **Transmit Control:** Press-to-talk with Mic. button, or manual transmit with panel switch. Automatic voice control when VOX is installed in AC console. **Microphone:** Dynamic or Crystal, high impedance. Requires 1/4 in. diam. 3 circ. phone plug. **Audio Fidelity:** 300 to 3000 Hz, plus or minus 3 db. **Meter:** Reads P.A. collector current, 0-16 amps. **Linear Amplifier Control:** Aux. socket on rear provides for keying of linear.

PLUG-IN-AND-GO-POWER



SOLID STATE

5 Band — 200 Watts

uniden 2020 PLL
DIGITAL SSB TRANSCEIVER

- Phase Locked Loop circuitary for optimum stability
- Separate USB/LSB/CW 8-pole crystal filters as standard and no frequency change required when going from USB to LSB
- Maximum accessibility to plug-in PCB modules, even the front panel can be swung out for easy servicing. Full spares catalogue plus parts available.
- Pair 6146B's in final with screen voltage stabilisation for minimum distortion products and a very clean output signal
- 90 day warranty
- Price $570 including mic, cables, plugs, English manual

Mode of Operation;	LSB, USB, CW and AM
Input Power;	180 Watts DC INPUT SSB & CW 90 Watts DC INPUT AM
Carrier Suppression;	50 dB
Sideband Suppression;	50 dB at 1,000 Hz
Spurious Radiation;	Down 40 dB or more
Distortion;	Down 35 dB or more
Microphone impedance;	High
Modulation Method;	Balanced modulation (SSB) Low Power modulation (AM)
Transmitter Frequency Response;	300 to 2,700 Hz (down 6 dB)
Frequency Stability;	Less than 300 Hz drift in starting Less than 100 Hz drift or less after 30 minutes of warm up
Antenna Output Impedance;	50 – 75 ohms unbalanced
Receiver Sensitivity;	0.3μV S/N 10 dB (at 14 MHz) SSB/CW 1μV S/N 10 dB (at 14MHz) AM
Image Interference Ratio,	–50 dB and more (at 14 MHz)
IF interference ratio;	same as above
Receiver selectivity;	SSB/AM 2.4 kHz at –6 dB and 4 0 kHz at – 60 dB CW 600 Hz at –6 dB and 1.5 kHz at –60 dB
Audio Output;	2.5 Watts or more (10% distortion at 4 ohms load)
Audio Output Impedance;	4 ohms
Power Source;	100/110/117/200/220/234 Volts AC 50/60 Hz 13.8 ±10% DC
Power Consumption;	AC: 350 VA at the maximum final input DC: 22A at the maximum final input. 7 A in receiving with final tubes heater "on" and 2A with heater "off"

Frequency Ranges;

Bands (meters)	Frequency (MHz)
80	3.5 — 4.0
40	7.0 — 7.5
20	14.0 — 14.5
15	21.0 — 21.5
10 (A)	28.0 — 28.5
10 (B)	28.5 — 29 0
10 (C)	29.0 — 29.5
10 (D)	29.5 — 30 0
11	27 0 — 27 5
WWV	15 0

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12 month warranty on all ICOM TRANSCEIVERS!

New! IC-202

144MHz SSB CW 3W TRANSCEIVER

✱ $199 $199

For the first time! PERSONAL/MOBILE/BASE 2M SSB.

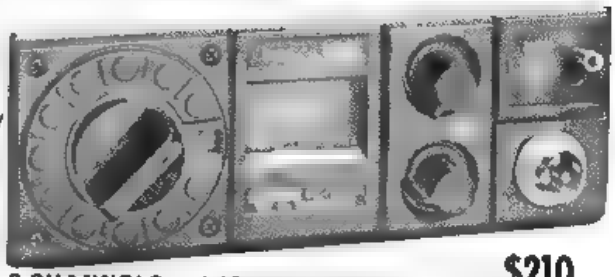
There have been 2m ssb mobile/base units — large, weighty and expensive! Now from the best known and specialist VHF manufacturer ICOM, comes the IC-202 — small, light weight and only $199.

FEATURES:

* Coverage 144-145MHz:
  144.0 – 144.2/144.2 – 144.4 (crystals provided)
  Provisions for other crystals (200KHz per xtal).
* VXO operation giving 200KHz with excellent stability.
* pep output 3 watts.
* cw output 3 watts.
* RIT tuning ± 3KHz
* noise blanker.
* receiver sensitivity 0.5 uV (S+N)/N 10dB
* receiver selectivity 1.2 KHz – 6dB
  2.4KHz – 60dB
* aduio output 1 watt
* battery external supply 13.8V @ 15%. Provision for internal dry cells or nicads.
* Size 183 x 61 x 162 mm.
* mass 2Kg.
* current drain max ssb 540ma Tx, 90ma av Rx.

Complete with mic, manual, carry-strap, dry cells and the VICOM 12 month warranty.

ICOM



6 CHANNELS and 12 MONTH WARRANTY $210

IC22A

Features:

* solid-state T/R relay
* PA protection
* 5 helical resonators
* 10/1 watt

Complete with cables, mobile bracket, mic, manual and 6 channels from the WIA Bandplan.

The IC21A is the 10 watt base station or mobile (146-148MHz) with variable power control, adjustable deviation, 24 channels, built-in discriminator meter, S meter, power/swr meter, PA protection and modular circuitary . . In addition:

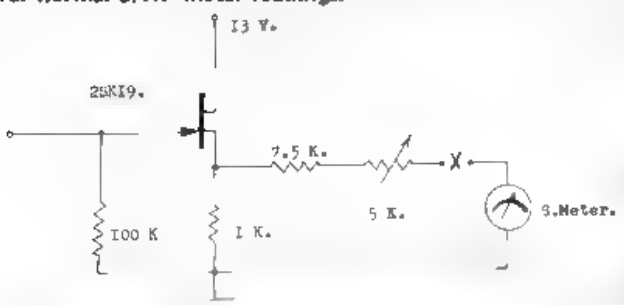
* low intermod, due to MOS-FET RF amp and 5 helical resonators
* calibrate position netting switch allows the IC21A to listen to itself on simplex channels.
* The RIT control offsets the receiver frequency to bring in signals which are not properly calibrated
* runs from either 240V or 13.8V
* complete with mic, cables, manual, 3 channels and the VICOM 12 month warranty
* PRICE $298.

The DV-21 PLL Digital VFO is a unique synthesiser to complete your ICOM 2M station (it can also be interfaced with other rigs). Runs from either 13.8V or 240V and can scan either empty frequencies or those being used. In addition, two programmable memories for favourite channels can be selected. PRICE $285.

DV21 COMBINATION DEALS:
IC22A plus DV21 $450
IC21A plus DV21 $570

WHAT'S THE NEW CALL SWITCH FOR ON THE IC-22A?

No, we don't expect another band-plan conference for tone access repeaters, but ICOM kindly left the switch in for other uses as takes your fancy. We have been using it to switch in the S meter so that you can use it as a discriminator meter. The switch is inserted at point X. Simply press the switch to read discriminator and release for normal S/RF meter readings.



The IC-501 ssb/am/cw transceiver is PLL VFO controlled and runs 10 watts. Separate filters for am/cw are built-in together with the internal ac/dc power supply. Covers 50-54MHz and price of $445 includes mic, cables and 12 month warranty.

The IC-60 has been designed along the lines of the successful IC-22A and runs 10 watts fm at 52.525 MHz. Includes mobile bracket, mic, cables, 2 channels and 12 month warranty, all for $236!

WIA Band Plan Xtals for IC22A/IC21A
Repeaters 1-7
Anti-repeat 1-7
Simplex: 40, 49, 50, 51, 52, 53,

$8.50 pr

IC-3PA

13.8v power supply for IC22A/IC60

PRICE $78

VICOM

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TRANSVERTERS

Trio TV-502 for TS-520 etc $243
QM-70 high pwr 10/2m cw/fm/ssb/am with input drive .5w for attachment to Uniden, FT101E etc $199
QM-70 solid state output 2w suitable for driving 6/40 ..... $105
QM-70 70cm transverter 10/70cm 26w pep output $168

70cm

VICOM 90 DAY WARRANTY ON ALL NEW PRODUCTS

Seiwa SU-710 transceiver runs 10 watts at 435MHz, complete with mobile bracket, mic, cables etc and VICOM 90 day warr $278

TEST GEAR

Yaesu YO-100 monitorscope $205
Yaesu YC-355D frequency counter $205
D-60 freq counter to 200MHz $360
Gilco 275 0-15MHz freq counter $210

RECEIVERS

Kit for 2m fm – complete except xtal $70
MR2 2m fm mini receiver incl 4 chs $85
Drake SSR1 general coverage receiver $420

ANTENNA ACCESSORIES

Ham-11 rotator, 230V ac with indicator control units $168
Oskarblock SWR200 swr/pwr meter with ranges 2/20200/200w to 200 MHz $49
Leader LPM885 swr/pwr meter $78
ME-UHF swr/pwr meter 15/5w $69
Balun BL-50a 52 ohm $18
Balun BL-70a 75 ohm $18
CX-2A 2pos coax switch $23
CX-6A(A) 6 pos 52ohm coax sw $54
BTF-1 600 ohm balanced feeder $12
CO-AX RG58AU 45c per metre
SH-7E lightning arrestor $15
VICOM low-noise 2m preamp $19

HF TRANSCEIVERS (we have used gear too!)

Uniden 2020 80-11m transceiver, complete $570
Uniden external PLL FVO $105
Uniden matching speaker $28
Yaesu FT101E 160-10m transceiver $689
Yaesu FV101E VFO for FT101E $102
Yaesu FL2100B linear amplifier $430
Kenwood TS-520 80-10m transceiver $590
Kenwood TS-900 – out of production
Atlas 210X 80-10m solid state mobile including noise blanker $695
Atlas AR-230 AC power supply $165
Atlas delux mobile mount (DMK) $55
Yaesu FT75B mobile transceiver $280
– FP75B AC power supply $70
– DC75B DC power supply $75

2 METRES FM

IC-22A incl 6chs, 12 month warranty $210
IC-21A base/mobile 3chs, 12 month warr $298
DV-2L PLL Digital VFO for above $285
Ken KP202 handheld incl 4 channels $150
Ken nicads and 230v charger $32

2 METRES SSB/CW

IC-202 portable, 3w ssb/cw $199
IC 201 base ssb/cw/fm $510
QM-70 solid state linear for fm/am/cw ssb/ at 2w(min) input for 50w rms out $102

antennas

NEW FM GAIN RINGO RANGER

The new Ringo Ranger ARX-2 2m omnidirectional offers 6dB gain over a ¼ wave whip. Features 3 half waves in phase and a 1/8 wave matching stub with an extremely low angle of radiation for better signal coverage. Tunable over a broad frequency range and perfectly matched to 52 ohm coax $36
Extension to old AR-2 ..... $15

WHIPS

HF HUSTLER RESONATORS

Precision wound with optimised design for each band, adjustable tip rod for lowest VSWR and badn-edge markers
RM-80 (80 metres) $26
RM40 (40 metres) $25
RM20 (20 metres) $20
MO-2 mast for resonators $26
BM-1 bumper mount $15

VHF

Lindenow 2m 5/8 fibreglass $21
– base for above $2.55
M25 Scalar 2m 5/8 fibreglass $16
M21 Scalar 2m ¼ s.steel $9
M60 Scalar 6m ¼ fibreglass $12
MGB magnetic base $33
18 Scalar standard base $5

ANTENNAE BY HY-GAIN

14AVQ 10-40m trap vert. $69
18AVT-WB 10-80m trap vert $95
TH3jr 10-15-20m 3 el yagi $145
TH3MK3 10-15-20m 3 el $190
TH6DXX 10-15-20m 6el yagi $240
2038A 20m monobander 4el $185

HF TRAP DIPOLES BY RAK

MIDY 111N 40-10m $38
MIDY VN 80-10m $44
AL48DXN 40/80m $38
AL24DXN 20/40m $28
A-4VPN 80m $28
A-8VPN 40m $30

ODDS AND SODS

SUPPRESSION KITS FOR THE MOBILE ENTHUSIAST!

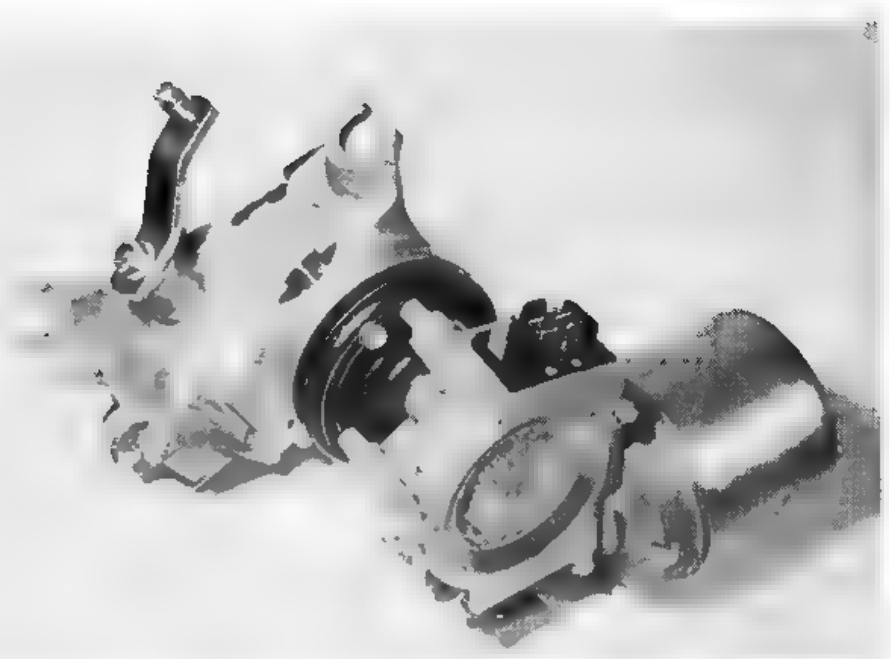
DC Power line filter (6410) incl 50A shielded cable and in-line suppressor avl in various lengths $19.80
Ignition suppression kit (6415) featuring military grade components, special coil cable, coil filter, suppressors with hardware and instructions. 6 and 8 cyl. kits avl. $25.70
Universal Suppression Kit (6405) for ignition and alternator suppression plus bonding material. 6 and 8 cyl. kits avl. $35.70

Regulated DC power supply board up to 15v at 4 amps depending on transformer secondary and value of current sensing resistors on board $24

VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM

AN ANTENNA ROTATOR

Brian F. Lavery VK1ZBL
65 James St., Curtin, A.C.T.



The ability to operate a rotatable beam gives a great flexibility in both the VHF/UHF region and the upper HF bands. Instead of paying a considerable sum of money for a commercial rotator, it is quite possible to build a modest unit without difficulty and for minimal cost. This article describes how to make such a unit. Position indication or automatic direction following is not described and is left to your own inventiveness. This device is not a complete rotator system. It is a slow motion drive unit, but of itself, it will not support a beam assembly.

The modern car windscreen wiper motor with its gearbox provides a suitable building block for making a home-brew antenna rotator. The permanent magnet motor can be reversed and the speed can be controlled by control of the supply voltage. The typical motor speed is 2000 RPM and the worm gearing gives a reduction of about 40:1 Two reductions in series yield an output of about 1 turn per minute, which is ideal for antenna control.

Second hand units are readily available from any car wrecker. The following constructional details are based on the Lucas link type permanent magnet motor. The Lucas designation is 13 AUW or 15 AUW, and was fitted to many cars built locally in the last few years. The 13 AUW and the 15 AUW come in several external configurations to suit the car models, and some have a piggy-back washer pump, but the internals are very similar

In brief, two wipers are used. The motor of the first drives the two gear reductions in tandem. The coupling shaft is made up from the discarded armature shaft, and the jointing plate is made from the discarded motor yoke. The degree of weather seal obtained depends largely on the care taken with the jointing plate. If all goes well, the only new items will be a few short screws.

☐ Choose wiper No. 1 (at your friendly wreckers), Lucas type 15 AUW or 13 AUW. Try to get one with a flat metal blanking plate above the gear wheel, rather than one with a washer pump, or even with a shaft stub showing through. Get a model with three mounting legs arranged evenly on a circle 2.3 inches pitch circle diameter (not 2.8 inches)

☐ Choose wiper No. 2, again without a washer pump (although it is not so necessary in this case). The mounting feet configuration is not important, except that these are the final mounting points for the finished product.

☐ Open the gearbox or wheelbox of wiper No. 1. If only a washer type could be obtained, discard the pump assembly altogether and make up a replacement blanking plate from flat sheet. If the plastic pump cam interferes with the plate, break it away from the plastic wheel with a screwdriver

☐ The plastic wheel must be removed intact from the output shaft to which it has been moulded (over a knurled end). Place the shaft in a 150 deg. C oven for some minutes, then apply a little workshop persuasion. Discard the shaft, but preserve its dished washer.

☐ It is best, but not essential, to remove the outer brass bush from where the discarded output shaft left the wheelbox. This reduces alignment complications later

☐ You may prefer not to open up the motor itself. If you do open it, take care removing the armature shaft through the brush assembly. On reassembly, which is a bit tricky, taken even more care not to damage the brushes too much. If warranted, the brushes can be replaced by the ones from wiper No. 2. Use side cutters and soldering iron, but do not allow solder to wet along the pigtail thus stiffening it. Note how the

springs thread onto the pigtail a little, and check they seat squarely on the bakelite pips so they do not arch when compressed. If a third brush is fitted, it (the centre one) may be deleted. (The 180 deg. pair are for slow speed, the 108 deg. pair for high speed.) The dual speed option may be an advantage, however. If the armature is stiff after reassembly, short hammer taps near the bearings will help realign them.

☐ Put this unit aside, and dismantle wiper No. 2, motor and wheelbox. For neatness, and if necessary, make up a blanking plate to replace the washpump section.

☐ Do not lose the small ball from the end of the armature. Make up a jig, or use a vice and flat punch, to drift all the components off the armature shaft.

☐ The knurling must now be removed so that the shaft can pass through the bush remaining in wiper No. 1. A lathe will make short work of this, but a vice and file can be used if necessary. Do not damage the rest of the shaft.

☐ The spare plastic wheel should now be pushed onto the long shaft, so that the shaft protrudes perhaps 1/16 of an inch. *Loktite* may be used if required to ensure a tight fit.

☐ Break the brushgear out of wiper No. 2. Remove the appropriate wires.

☐ Place the new shaft into wiper No. 1. Electrically run up motor No. 1 in each direction in turn. Check that the parking and braking contacts underneath the wheel do not object to the wheel turning backwards from the original Lucas design. Modify or even remove if necessary. (You may find these contacts provide useful signals for your control system.)

☐ Repeat with the other wheel in unit No. 2. (Rotate by hand).

☐ Put the dished washer (concave to the wheel) and the little metal ball on the new shaft. Place the shaft in wiper No. 1, and cover with the blanking plate. The total washer compression is about .060 inch. Deform the plate (or shift the wheel on the shaft) to load the washer to about half its compression.

☐ If the correct wiper has been chosen for unit No. 1, a short section of the yoke (motor casing) from unit 2 can be used as a jointing section between unit No. 1 and unit No. 2. Place the two units together, joined by the new shaft. Check that the worm engages reasonably centrally with the wheel in unit No. 2, and measure the spacer distance to be made out of the yoke. It should be approximately half inch. Take care to cut the jointing piece quite square, otherwise the new shaft will not align correctly against the wheel. Cut a neat hole in the joint (after removing the unwanted rear bearing from it) to take the centre post of wiper No. 1. Drill 3 holes (at 2.3 inches diameter) to mount the legs of wiper No. 1.

(If a lathe is available, it will simplify cutting both ends of the jointing plate.)

☐ Find some screws to join up the two halves. Set the end float screw on wiper No. 2 to a nominally small clearance. (This screw will absorb small errors in jointing plate thickness.)

☐ Note that no matter where the holes are drilled in the jointing plate, unit No. 1 may be orientated within 30 deg. of any desired angle relative to the mounting position of unit No. 2.

(If by ill fortune your wiper No. 1 does not have the mounting feet as described, you will have to work out a jointing plate for yourself.)

☐ Finish assembling the whole unit, remembering that a spring washer goes under the crank lever on unit No. 2.

☐ Apply power to the motor terminals and check the operation in both directions. If desired, dismantle and lubricate carefully (one drop of oil for the porous bushes, a grease smear over the worms and wheels), unless of course you remembered this as you went. It would pay to devise suitable weatherproofing for all joints.

Some technical comments on this machinery. The motors are fairly sturdy, being of the order of 1/12th horsepower. The current consumption for this application should only be a couple of amps, as the load through two reductions should be light on the motor. The normal life of these motors is many hundreds of hours on load (continuous), so for this application they should last a long time indeed if kept corrosion free. The rated voltage is 13.5V, but for this application a variable voltage of say 4V to 16V could be used for speed control. Do not forget the inductive characteristics if you use some fancy control system. The motors will be an EMI problem. I have not tried to solve that yet.

On the mechanical side, there may be a risk of stripping the wheel teeth if a large antenna system is lashed in a storm. The best protection is to check that the alignment of the new shaft holds the worm firmly against the wheel teeth. There are two slightly different tooth forms for the worm and wheel, so the best advice is do not mix the two combinations you obtain in case you do in fact have different sets. (Both have a gearing ratio of 62:2.)

That's it. The direction control or direction indicator, and the coupling of the rotator described here to your array, are left to your ability and imagination. ■

Try This

with Ron Cook VK3AFW
and Bill Rice VK3ABP

AN AUDIO FREQUENCY NOTCH/Q MULTIPLIER

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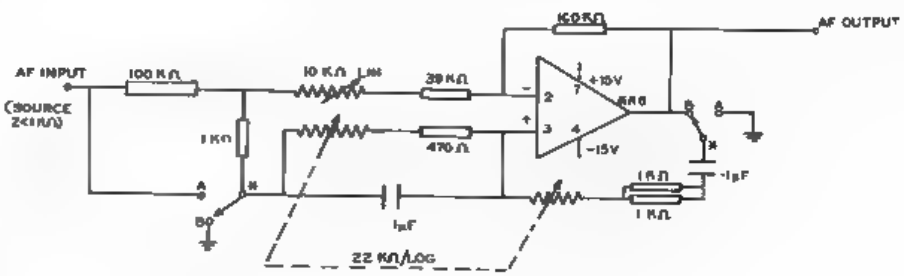
Integrated circuitry has made many new circuit designs possible. The way things are going we will probably see a chip replace the circuitry inside TV sets. More modest advances are already present. High gain linear operational amplifiers mean active filters are convenient to make, particularly at audio frequencies. One application for this type of filter arises when trying to avoid interference from an adjacent carrier, or when trying to dig out a weak CW signal.

One advantage of an audio frequency notch/Q multiplier is that it is not necessary to distinguish between USB and LSB when tuning it. Also, the setting of the frequency potentiometer is directly related to the audio frequency. One disadvantage is that the notch does not filter out the AF harmonic distortion present in the detector. These harmonics should be relatively small at normal signal levels, particularly if a product detector is used.

The active notch/Q multiplier (see circuit diagram) is tuned using only two resistive elements. The ratio of these resistors effects the Q of the Q multiplier, making the use of high quality potentiometers an advantage. ■

AUDIO FREQUENCY NOTCH Q MULTIPLIER



R 2 POLE 2 POSITION SWITCH POSITION A - NOTCH. POSITION B Q MULTIPLIER
IC LM 741 (PIN CONNECTIONS FOR 8 LEAD METAL CAN)

A TILT-OVER POLE

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A tilt-over pole is worth consideration for supporting amateur antennas. It can be used to erect VHF directional arrays without the need to climb a tower to install and adjust. It solves the old problem of broken halyards and is much cheaper than a tower. If the stub pole is long and strong enough, guys may be dispensed with in most cases. Here is a description of a tilt-over pole erected by VK5JG.

Although a straight tree trunk (or surplus telegraph pole) of about 10" diameter would make an ideal stub pole, this is not easy to come by and deliver into a suburban garden. It was found convenient here to make the pole of reinforced concrete. The pole is set 5' into the ground and the diameter below ground is 15". Above ground the diameter is 11¼". This diameter happens because a 3' wide sheet of 24 gauge iron was rolled into an 11¼" diameter cylinder (½" overlap) and fastened with self-tapping screws to make the mould which was 4'6" long.

The pole is reinforced with 5 x ½" diameter rods set to give a minimum cover of 1" of concrete. The reinforcing rods can be held in position by fitting into 5 x ½" diameter holes drilled in an 8" circle in a flat piece of wood. One such piece can be set in the bottom of the foundation hole and left in the concrete, while one or more others are slid up the rods as the concreting progresses. However, if a welder is available it will be preferable to weld several ¼" diameter steel rings inside the 5 rod circle to make a rigid cage of the reinforcing steel instead of using wooden plates.

After the foundation hole was filled with concrete, the mould was placed around the protruding rods and rested on the top of the concrete and another 6" of concrete was poured into the mould. The mould and rods were then carefully set vertical and the concrete allowed to set. A week later the mould was filled to the top, then each week the mould was set up with the bottom 6" around the top of the previous pour and filled until the required height was reached.

Half inch steel climbing steps were fitted by setting ½" nuts in the concrete using the method shown in Fig. 1.

The stub pole at VK5JG projects 15' above ground. The tilt-over pole is 33' long and is a relic of the crystal set days of the 1920's. It had been rounded and tapered from a length of 4" x 4" oregon. The pole can be tilted as shown in the photograph and lifted up again in less than two minutes if guys are fitted and the lifting is done on a calm day. The pole is

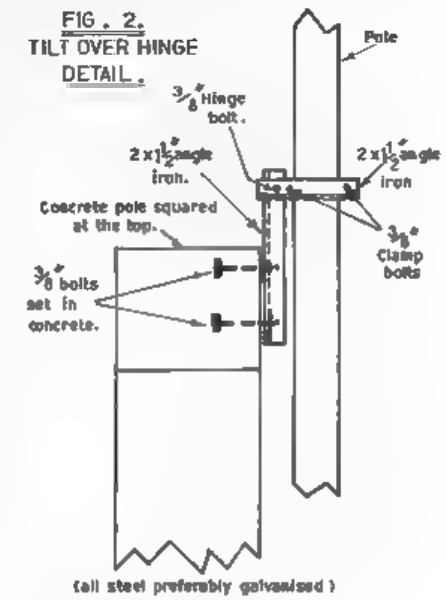

FIG. 2.
TILT OVER HINGE DETAIL.

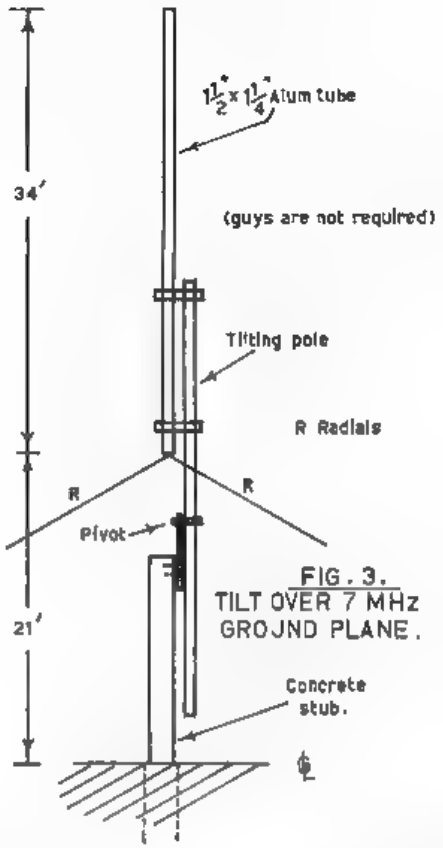

FIG. 3.
TILT OVER 7 MHz GROUND PLANE.

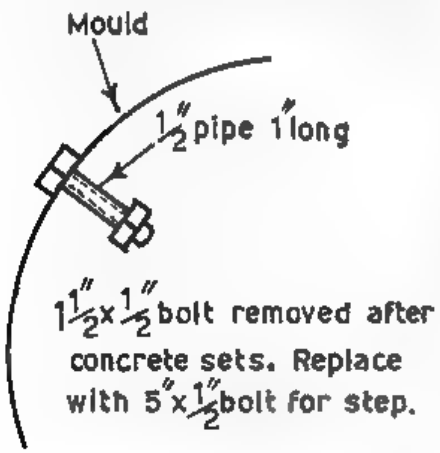

FIG. 1.
STEP HOUSING.

strong enough to support a light weight 14 MHz or 21 MHz beam though some difficulty would be experienced in handling the array onto the end of the pole in the tilt-over position. The attachment of the pole to the stub pole is shown in Fig. 2.

Concrete materials required for a 15' stub are:

Cement — 4 bags
¾" Screenings — 12 cwt.
Sand — 7 cwt.
½" reinforcing steel — 4 x 20'

The concrete stub pole is round. The wooden tilting pole is square for the bottom 5' but round for the remainder. The author's concrete pole differs at the top from the one sketched. It has a T head for an observation platform and is provided with sockets in this head so that other short masts can be attached if required.

Adhesion between pours is no problem. In reinforced concrete design the concrete is assumed to develop no tensile strength — only compressive strength. The reinforcing steel provides the tensile strength. Therefore adhesion across the pour joints is not essential.

However, to make a neat joint I reduced the proportion of stone in the mix for each first batch thus increasing the proportion of mortar and preventing the formation of unsightly air holes between stones at the joint.

The fifteen foot pole could have been cast in one pour but it would have required an expensive 15' mould, a vibrator for compacting the concrete at the bottom of the deep mould, and a 15' platform erected alongside from which the concrete could be poured.

With four foot pours I placed a ladder against a piece of timber bolted to the previous set pour in the step bolt poles and worked from this.

At present the pole is supporting a 7 MHz ground plane antenna as per Fig. 3. This was attached and erected single handed in about 2 hours. ■

WHAT'S INSIDE THE BATTERY

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No electronic component is taken so much for granted as the humble but very essential battery. Many hams know the workings of the most advanced solid state device but little about the most common type of cell. The purpose of this article is to uncover the mystery of the battery and to see what makes it ■

1. ELEMENTARY CHEMISTRY

It is obvious that the knowledge of chemistry possessed by readers of AR will vary greatly, and this article is intended for all, so chemical reactions will be portrayed in words and pictures, that is in chemical names and chemical symbols.

Firstly a rapid coverage of elementary atomics. Atoms consist of one or more electrons whirling around a nucleus of the same number of positive charges; that is, each atom is electrically neutral. If an atom or group of atoms gains or loses electrons it forms a positive or negative ion.

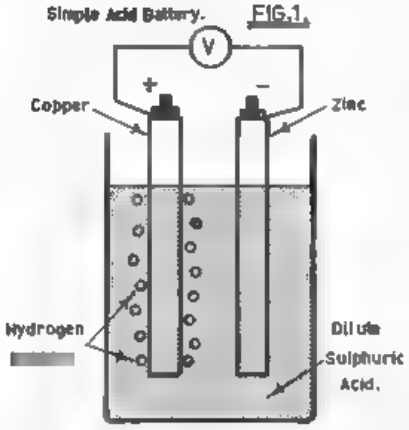
When a metal is dipped into a solution containing its own ions (one of its own salts), for example zinc in zinc Sulphate, positive ions of the metal leave it and pass into the solution. As defined in the previous paragraph these ions are metal atoms minus one or more electrons which remain on the undissolved metal so giving it a negative charge. Metals vary in this tendency, for instance Zinc tends to ionize more readily than does Copper and with the noble metal Platinum the tendency is almost non existent.

Under standard conditions each metal develops a characteristic voltage when in equilibrium concentration with one of its own salts. An electrochemical series can be established for example, Copper is more positive than Zinc which is in turn more positive than very reactive metals, for example Sodium.

A representative series would be:
Gold, Silver, Mercury, Copper, Hydrogen, Lead, Nickel, Cadmium, Zinc in order of decreasing positivity.

Note that Hydrogen appears in this series. As we shall see Hydrogen chemically (but NOT physically) resembles the metals and the common mineral acids Hydrochloric and Sulphuric may be considered as 'salts' of Hydrogen. Expert chemists please note, this series is in reverse to that which measures the tendency of metals to lose electrons in a chemical reaction; there Sodium is highly electropositive and Copper only weakly so.

Simple Acid Battery. FIG.1.

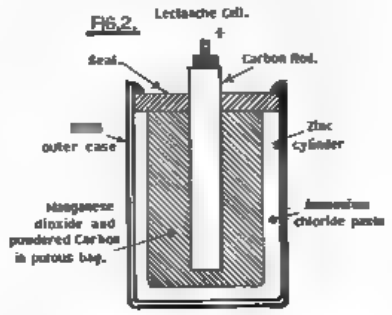


2. A SIMPLE PRIMARY CELL

A primary cell is one that has a single working life. It is ready to work as soon as its components are assembled and requires no initial charging current. Let us now consider the workings of a simple battery or cell.

A Copper rod and a Zinc rod are placed in a jar of dilute Sulphuric Acid (Fig. 1).

FIG.2. Leclanche Cell.



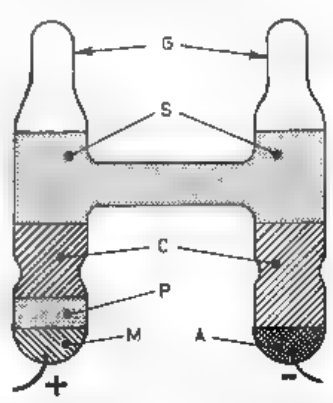
Sulphuric acid yields Hydrogen ions so we have Copper, Hydrogen and Zinc in order from our series. The Zinc rod rapidly loses electrons so the rod acquires a negative potential with respect to the electrolyte in its vicinity. For the Copper rod this tendency is much less, in fact it acquires a layer of Hydrogen ions from the electrolyte and becomes positively charged with respect to the electrolyte in its vicinity.

It is not hard to imagine what will happen if the rods are joined by a conductor or the voltage between them is measured. Electrons flow through the external circuit from the zinc to the copper rod.

The circuit is completed in the electrolyte, the loss of electrons from the zinc rod raises its potential so allowing more zinc ions to pass into solution. The electrons gained by the copper rod through the external circuit combine with the hydrogen ions to form hydrogen atoms which escape as hydrogen gas.

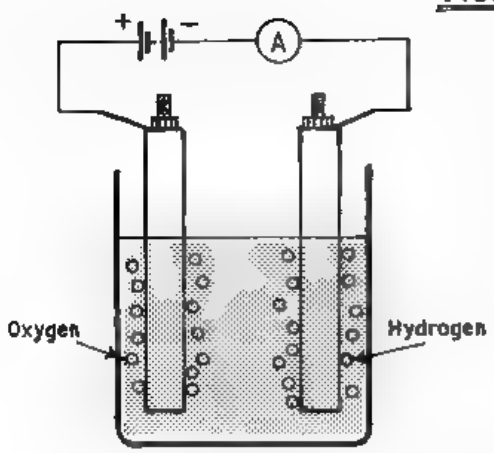
Experiment shows that a potential difference exists between any pair of dissimilar conductors (here copper and zinc) immersed in an electrolyte which reacts chemically with one of them. In our example this was zinc which, as discussed, loses some of its material as ions to the solution.

FIG. 3 Weston Cadmium Cell.

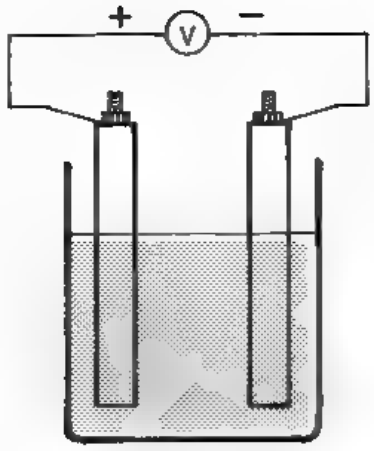


G. Glass container. P. Mercurous Sulphate paste.
S. Saturated Cadmium Sulphate paste. M. Mercury
C. Cadmium Sulphate crystals. A. Cadmium Amalgam.
±. Platinum wires sealed through glass container

FIG. 4.



Charge cycle



Discharge cycle

There is one great practical weakness to our simple cell. If the current through a small resistor joining the positive and negative electrodes is measured, it will be found to rapidly decrease to a low value and at this time many bubbles of hydrogen gas can be seen adhering to the copper rod. The cell is said to be in a polarized state. The effect is twofold:

1. The bubbles act as an insulating shield so raising the internal resistance of the cell.
2. The cell now acts a a hydrogen-zinc cell not a copper-zinc cell. This new system has a lower EMF. (This is predicted from our series, hydrogen is closer to zinc than copper is to zinc.)

If the layer of hydrogen bubbles is removed by a depolarizing agent the cell will continue happily as before.

Usually this agent adds oxygen to the hydrogen to form water.

Manganese Dioxide is often used.

3. PRACTICAL PRIMARY CELLS

Several types of cells will now be examined in the light of the two prerequisites already mentioned, two conductors in an electrolyte which reacts with one of them and a depolarizing agent if the evolution of hydrogen gas is involved. Although many common cells are called dry they are not really dry but moist. They contain no free flowing liquid however so can be used in any position without spilling

(a) The Leclanche Cell

Fig. 2 shows this cell in section. The zinc container is the negative electrode and the carbon rod the positive one. The latter is surrounded by a mixture of Manganese Dioxide and powdered carbon in a porous sac, the space between this and the zinc being filled with an ammonium chloride paste

Electrode reactions are briefly

1 At the negative zinc—Production of zinc ions which pass into the solution leaving the electrode with excess electrons.

2. At the positive carbon — Ammonium ions react with and gain electrons from the manganese dioxide leaving it with excess positive charge.

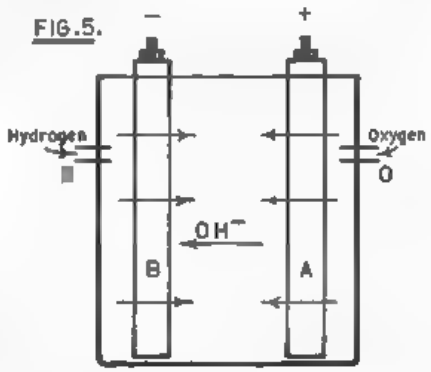
The exact chemistry of this cell is uncertain but when current flows a complex compound of zinc, chloride and ammonium ions is formed in the electrolyte.

Cells of this type have an EMF of about 1.5 volts and an internal resistance which rises with cell use very sharply, in fact near the end of its working life.

(b) The Alkaline Dry Cell

This cell differs from the Leclanche type in that a highly alkaline electrolyte, Potassium Hydroxide is used. Zinc reacts with this electrolyte so fulfilling our first battery requirement. Hydrogen gas is not formed so no depolarizer is needed. These cells have a lower internal resistance than the Leclanche cell and the EMF is about the same. They are very suitable for continuous use.

FIG. 5.



(c) Mercury Cells

In mercury cells the negative electrode is zinc and the positive one is the mercury formed from mercuric oxide which is also the depolarizer. A strongly alkaline electrolyte of potassium hydroxide and zinc oxide is used. In use zinc ions enter the electrolyte (a familiar story by now) and displace hydrogen ions which move to the mercuric oxide. Here mercury ions are displaced and the hydrogen combines with the oxygen to form water. The mercury ions in turn accept electrons at the positive electrode (these have arrived via the external circuit), and become mercury atoms forming the prementioned positive electrode. These cells have a very long life and are very stable, so stable that they may be used as a voltage standard for instrument calibration, accurate enough at least for Amateur Radio purposes. Their terminal voltage is 1.35 volt.

(d) The Weston Cadmium Cell (NOT a [illegible])

This cell is included in the discussion only for interest. It is used as a source of standard EMF for calibration purposes, in particular 1.01864 volt at 20 deg. C. This cell is not to supply current as such, any current exceeding about one milliamp will ruin it. The positive electrode is mercury and mercurious sulphate paste and the negative electrode cadmium amalgam (a solution of cadmium in mercury) in saturated cadmium sulphate. The mercury gains mercury ions so becoming positive to the electrolyte, the cadmium loses ions and becomes negative to the electrolyte. Electrons flow through an external circuit from cadmium to mercury and to maintain equilibrium the cadmium continues to lose and the mercury continues to gain ions.

4. SECONDARY CELLS

Before examining specific types of secondary cells, a few words on how they differ from primary cells. Primary cells do not require charging to achieve a working condition, but when their active materials are exhausted they are discarded. Secondary cells do require an initial charge to achieve working condition in the reverse direction to their discharge current.

Some specific secondary cells will now be described:

(a) The Lead Acid Cell

The principle of the lead acid cell is shown by placing two lead plates in dilute sulphuric acid and connecting them to a source of DC, say four volts or so. Electrolysis proceeds, hydrogen is evolved at the cathode and oxygen at the anode, (Fig. 4). After some time the cathode is unchanged but the anode is covered with a chocolate coloured layer, Lead Dioxide.

If the charger is disconnected and a voltmeter is substituted it will be found that this plate is about 2.1 volts positive with respect to the uncoated lead plate, and that this cell will drive current through an external circuit until ultimately current will cease and both plates are covered with a white layer of lead sulphate. This cell can

FIG. 6A.

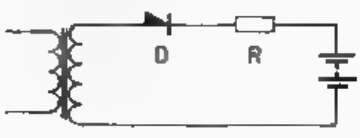
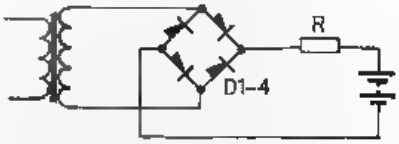


FIG. 6B.



be charged again as in the original situation and recycled. This then is the principle of the lead acid cell. Originally they were made this way (the Plante Process). Today the original negative plate is lead and litharge or lead oxide and the positive plate is lead and red lead. When charged the litharge converts to spongy lead and the red lead to lead dioxide as in the original case.

During discharge lead sulphate is deposited and the sulphuric acid concentration and hence the density of the electrolyte decreases providing the familiar hydrometer test for state of charge.

The EMF of this cell may reach 2.2 volts, but drops quickly to 2.0 volts and remains steady till very near discharge. This cell has a very low internal resistance (about 0.005 ohm) permitting very large current drains, for instance to operate the starter motor of a car

(b) The Nickel Cadmium Cell (The Familiar NiCad)

This secondary cell uses a highly alkaline Potassium hydroxide electrolyte. The positive and negative plates are of perforated steel: the positive one is filled with Nickelic oxide hydroxide and the negative one with finely divided metallic cadmium. During discharge the positive electrode is reduced to Nickelous Hydroxide and the negative one oxidized to Cadmium Hydroxide. During charging the changes are reversed. A fully charged NiCad has an EMF of about 1.3 volts but this falls to 1.1 as discharge proceeds.

6. FUEL CELLS

Electric cells make the energy liberated in a chemical reaction available as increased potential energy of electric charges at the electrodes. Cells must be either discarded when the supply of a reactant is exhausted (primary cells) or recharged from an external source (secondary cells). A fuel cell absorbs fuel continuously and produces a voltage as long as it is fed.

The operation of a fuel cell is the reverse of electrolysis. If you electrolyse water, that is pass a current through it, oxygen is liberated at the anode and hydrogen at the cathode as the hydrogen and hydroxyl ions react.

Fig. 5 represents a hydrox fuel cell. Here hydrogen and oxygen react and water and an electric current are produced. A and B are porous platinum or carbon electrodes into which hydrogen and oxygen gas are forced at H and O respectively.

The electrolyte is dilute sulphuric acid. This seeps into the electrodes and meets hydrogen at A and oxygen at B. In A oxygen atoms capture electrons from the electrode becoming oxygen ions. These ions then react with water to form hydroxyl ions which migrate through the electrolyte to B where they give up electrons and combine with hydrogen to form water.

Gaseous hydrogen and oxygen react very slowly at room temperature so hydrox cells operate at 200 deg. C and 400 p.s.i. Theoretically fuel cell efficiency is 100 per cent with 75 per cent being actually obtained. Steam driven generating plants typically operate at 25-30 per cent efficiency.

Other reactants have been used in fuel cells, for example methane, ammonia and hydrazine.

8. SOLAR CELLS

These are diodes made so that light may fall on the depletion layer of the PN junction. The incident light photons or 'bundles of energy' create many electron-hole pairs in this region which migrate in either direction under the influence of the depletion field. This means that the junction drift current exceeds the junction diffusion current and equilibrium is disturbed. This causes a nett EMF across the diode, the P type material becoming positive because of excess holes and the N type negative because of excess electrons.

7. THE CHARGING OF SECONDARY CELLS

This is a specialised subject in itself. Only one method will be mentioned here, that of constant current. This is not only the cheapest method (requiring only a transformer, diode and resistor) but also prevents the possibility of thermal runaway. The supply voltage is made much greater than the battery voltage and the current limited by a large amount of series resistance. A half wave rectifier circuit suffices for currents up to 0.5 amp (Fig. 6a) or a bridge rectifier (Fig. 6b) for greater currents. No filtering is required as the cells have a large equivalent capacitance. The value of resistance R is calculated by Ohm's Law using the desired charging current as the I value. An incandescent globe of the appropriate wattage makes an excellent resistor. The charging factor used is 1.4, that is 1.4 times the capacity removed from the battery must be replaced The application of the recommended 10 hour rate for an overnight period makes for charging convenience.

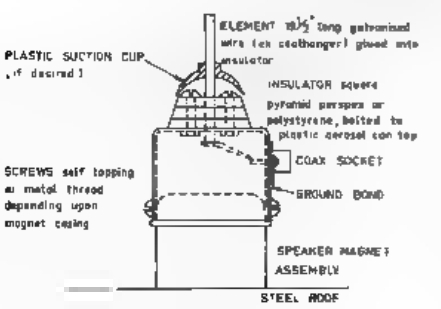
Well there we have it, the story of the cell or battery. This is of course a skimming of the surface of the full story but I hope it has put the more pertinent facts together and lifted the lid on a subject that gets very little coverage in the standard Amateur Textbooks. More detailed references can be given to any interested reader. ■

Try This

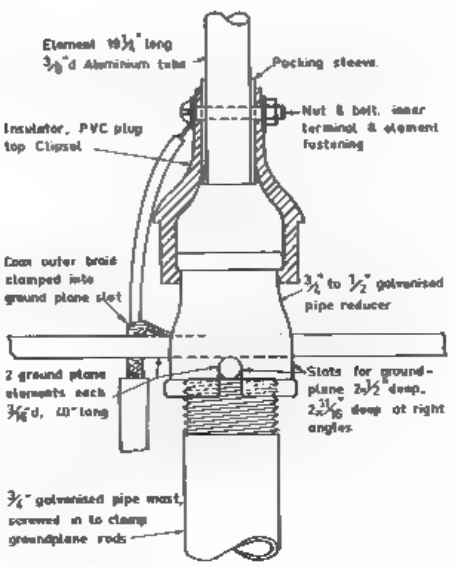
with Ron Cook VK3AFW
and Bill Rice VK3ABP

TWO SIMPLE ANTENNAS FOR TWO-METRE FM

Here are two different approaches to the problem of quickly and cheaply constructing simple quarter-wave vertical antennas suitable for working through your local repeater. Both use readily available "junk-box" materials. One is intended for mast-top mounting, the other has a magnet base to use on top of a car or, in the author's case, on the flat steel roof of the shack. Hopefully the drawings tell most of the story, but a few comments may help.



VK3WW SIMPLE MAGNETIC MOUNT ANTENNA



VK3AOD SIMPLE 2 METRE GROUND PLANE ANTENNA

VK3AOD Ground-Plane

1. The packing sleeve is necessary because the inside diameter of the plug-top sleeve is more than ⅜ inch.
2. The coax connections should be weather-proofed with at least PVC tape. With a little ingenuity it should be possible to run the coax up inside the mast, making weather-proofing much easier.

VK3WW Magnet Mount

1. The plastic suction-cup is a refinement, again for weather-proofing (and appearance), but is not really necessary.
2. Both speaker magnets and aerosol cans are made in a variety of sizes, so finding a matching pair should not be too difficult.
3. Some speaker magnets (notably ferrite, and old Alnico types using a ring magnet) are unsuitable as they are too hard to drill or tap. Even with soft iron cases, it is probably best to tap the holes (say ⅛ Whit or 4 BA) rather than use self-tapping screws, but the latter may do if the holes are only slightly less than clearance diameter. ■

A SOLID STATE 6 METRE SSB TRANSCEIVER

Peter Collins VK3ZYO
5 Van-Wyk Court, Springvale South, 3172

Here is a solid state transceiver for the VHF home brew amateur. If you cannot afford a commercial rig but have a yen for working 6 metre DX then this is the rig for you. Alternatively, if you own an HF transceiver and would like to build a modern transverter then the circuits in this article are just what you need.

This transceiver has evolved over a number of years; the original concept was to develop a solid state 3 to 5 watt SSB 6 metre transmitter. Having achieved this, it was a fairly simple task to add the receiver circuits, as only front end, IF, detector and audio stages are required.

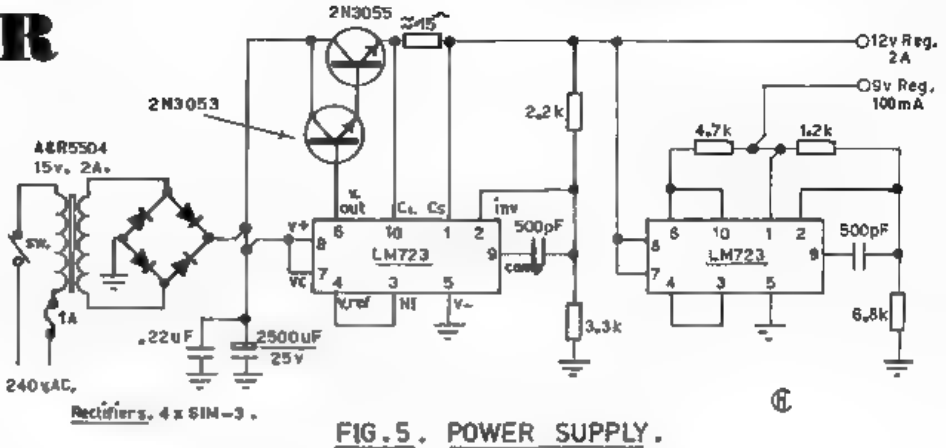


FIG.5. POWER SUPPLY.

FIG.1. DOUBLE CONVERSION Tx.

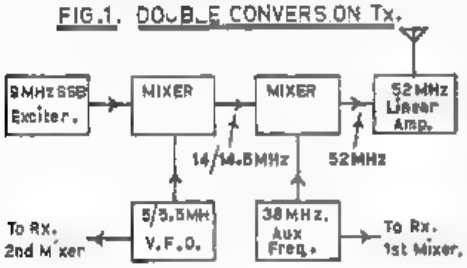


FIG.2. PREMIXING Tx.

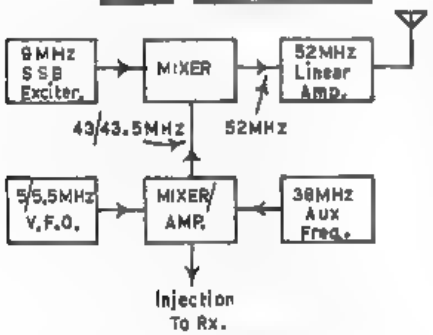


FIG.3. TUNEABLE IF Rx.

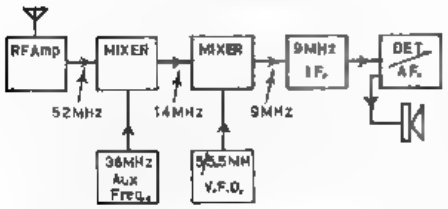
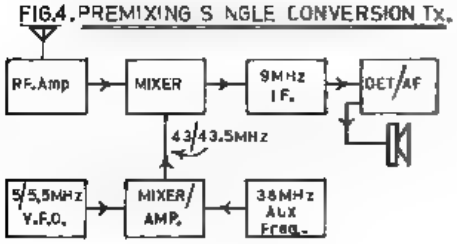


FIG.4. PREMIXING SINGLE CONVERSION Tx.



The transceiver uses conventional frequencies: 9 MHz filter, 5-5.5 MHz VFO, and a heterodyning frequency of 38.0 MHz.

Using these frequencies there are two ways to arrive at the final frequency of 52-52.5 MHz. The method usually chosen mixes the VFO and 9 MHz SSB frequency using the sum to obtain a 14.0-14.5 MHz SSB signal which is then mixed with the 38 MHz signal to obtain 52-52.5 MHz (see Fig 1). The advantage of this method is that the 14 MHz signal can be used for HF operation on 20 metres. The disadvantage of this approach is that it is virtually impossible to obtain a constant output over the 500 kHz range without an external tuning control. This adds to the complexity of construction as well as making operating more difficult due to the extra control requiring adjustment when changing frequency.

A more suitable approach when designing a transceiver specifically for one band VHF operation is shown in Fig 2. This arrangement allows the use of bandpass circuits which, at the higher frequency, allow the output to remain relatively constant over the required range.

A further advantage is realised when the receiver circuit is considered. (See Figs 3 and 4). The 14.0 MHz approach is shown in Fig 3 and uses the tuneable IF system commonly used in VHF receivers. This requires the use of dual conversion with its inherent problems.

The arrangement used in this design is shown in Fig 4 and uses a single conversion from signal frequency to a 9 MHz IF frequency. This is a more acceptable method as it eliminates one mixer, and mixers are the main cause of poor strong signal performance, cross modulation, etc. The use of a variable injection frequency for receive and transmit has been used with good success, as the bandpass cir-

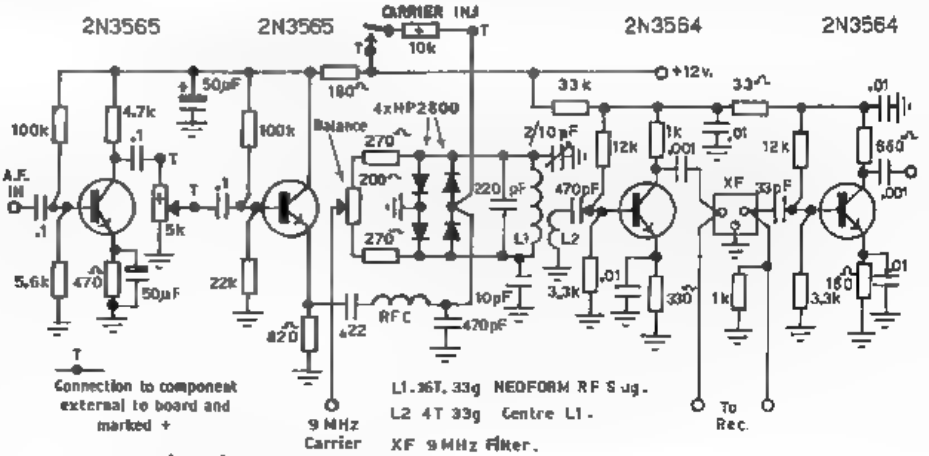


FIG.6. 9MHz. SSB GENERATOR CIRCUIT.

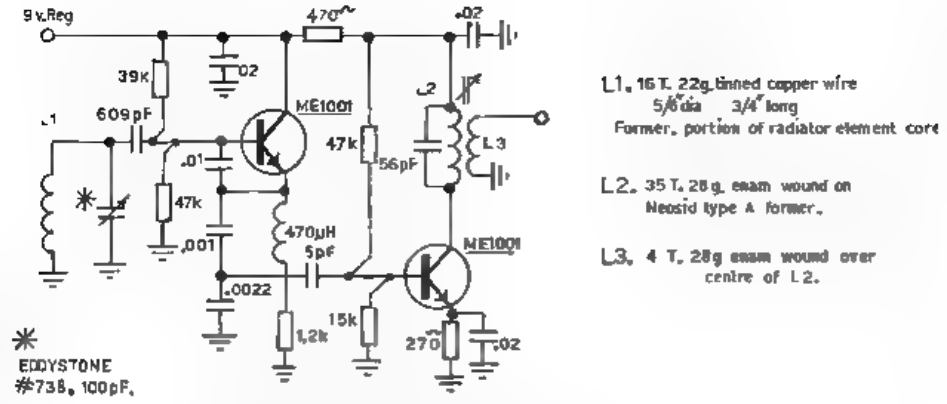


FIG. 7. V.F.O. CIRCUIT.

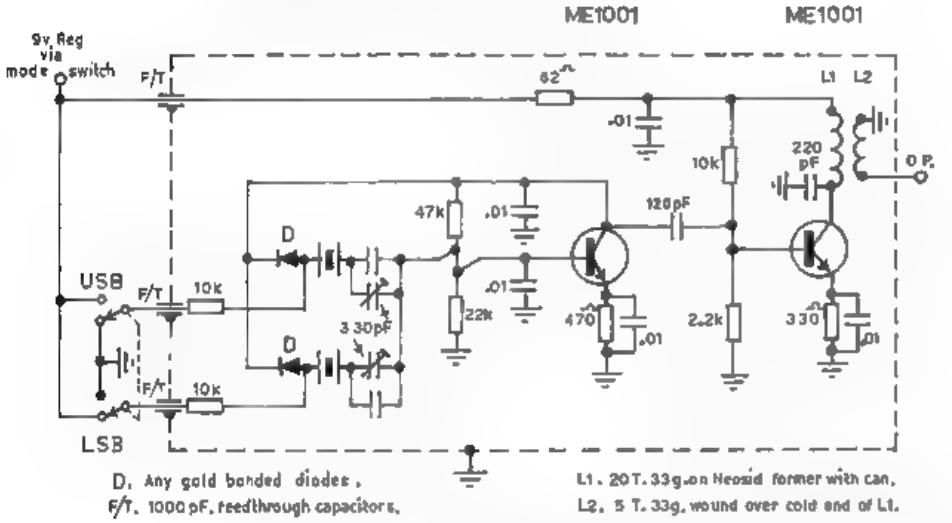


FIG. 8. CARRIER OSCILLATOR CIRCUIT.

cults are capable of being adjusted, with the aid of a sweep generator, for reasonably flat response over a 2 MHz bandwidth. The inclusion of auxiliary frequency crystal oscillators, on 38.5, 39.0, and 39.5 MHz. In addition to the 38.0 MHz oscillator, extends the coverage to the full 6 metre band, 52.0-54.0 MHz.

CIRCUIT DESCRIPTION

Each of the following sub-titles designates portion of the circuit, each of which is built on a separate module/PCB

POWER SUPPLY

The power supply is designed around two low cost 723 ICs, which feature excellent regulation with an internal current limiting facility. (Refer Fig 5). Although discrete components could be used it would not be possible to duplicate the performance without a considerable increase in size and cost. The 12 volt supply is capable of supplying the 2 amps which is required by the transmitter under full drive. Current limiting is commenced at a level slightly in excess of the required 2 amps. The 12 volt regulator IC drives a 2N3053 which drives a series pass transistor type 2N3055. The input/output differential of these ICs is approximately 3 volts, therefore the second regulated voltage must be at least 3 volts below the 12 volt rail. The 9 volt supply is current limited at 100 mA and supplies all the oscillators.

The mains transformer supplies 15 volts DC at 2 amps and employs 3 amp diodes in a conventional bridge.

SSB GENERATOR

The 9MHz SSB generator uses two 2N3565s which amplify the output from the dynamic microphone to the level required by the balanced modulator. The 9 MHz carrier input is permanently connected to the module. The carrier is suppressed by the balanced modulator which uses 4xHP2800 hot carrier diodes. This circuit provides excellent carrier suppression and stability. The DSB signal is then amplified by a 2N3564, the collector circuit providing matching to the filter input. Following the suppression of the unwanted sideband by the crystal lattice filter, the SSB signal is then further amplified by a 2N3564 linear amplifier. The output of the module being approximately 0.5 volts RMS. The filter used in this rig was from an FT 200; use of an alternative filter would require the use of different terminating components as recommended by the filter manufacturer.

VFO

The VFO used in this rig was described in AR June '70 and provides excellent stability with reasonably linear calibration. The VFO tunes from 5-5.5 MHz. The only modification made was the use of a PCB and alternative housing.

CARRIER OSCILLATOR

The carrier oscillator circuit allows the use of the crystals supplied with the filter. Other circuits would not allow the 9 MHz crystals to oscillate when pulled to the correct frequency. Although switching has been used for changing between USB and LSB crystals, the facility has not been incorporated in the receiver mode switching

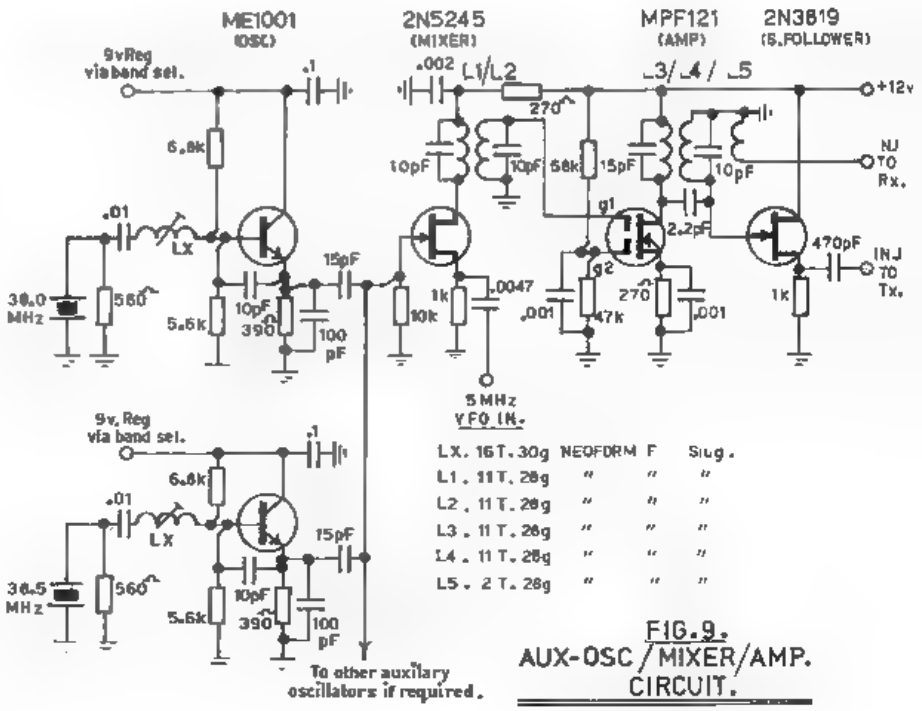
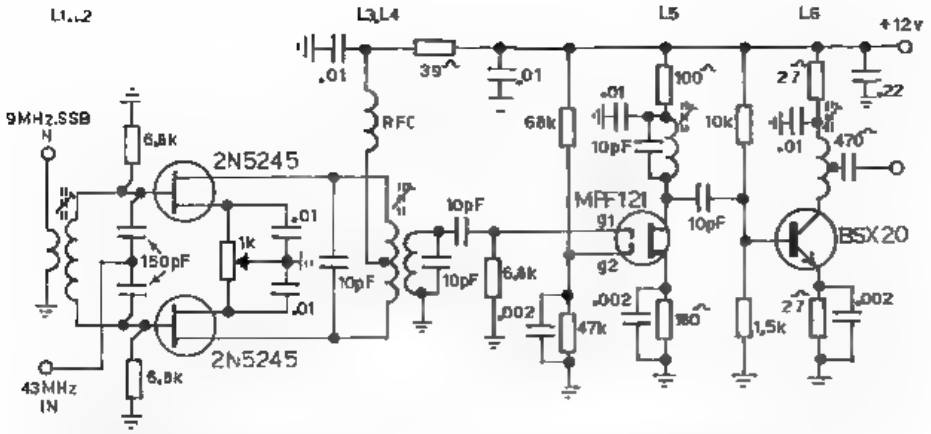


FIG. 9. AUX-OSC/MIXER/AMP. CIRCUIT.



L1. 5T 33g B&S. over centre of L2.
L2. 32T 28g B&S. Neoform F12 Slug.
L3. 12T 28g B&S (Centre tapped) Neoform F22 Slug. (Double Neo with L4.)
L4. 10T 28g B&S. Neoform F22 Slug. (See L3.)
L5. 8T 24gB&S. Single Neo F22 Slug.
L6. 10T 24gB&S Single Neosid F22 Slug. Tap 4T up from "cold" end.
RFC. F22 Neo Slug. 8T 33g through alignment slot.

FIG.10. TX CONVERTER/AMPLIFIER CIRCUIT.

as it is not necessary for VHF use. The completed module is housed in a metal shield case to provide isolation, and therefore improved carrier suppression on transmit, and to prevent coupling into the receive IF. The carrier oscillator is also fed to the product detector for SSB demodulation. The output level is approximately 0.7V RMS.

AUXILIARY FREQUENCY OSCILLATOR/ MIXER/BAND PASS AMPLIFIER

This module contains two auxiliary frequency crystal oscillators at 36.0 and 38.5 MHz. The required oscillator is selected by the range selector switch e.g. — 52-52.5, 52.5-53.0 MHz. The output of the selected oscillator is fed to the gate of the mixer which employs a 2N5245 FET. The VFO output is fed to the mixer source. The mixer drain coil is tuned to the sum of the two frequencies and is mutually coupled to the coil in the gate of the subsequent stage. A dual gate FET is used as the amplifier. The amplifier tuned circuits can be tuned to cover a 2 MHz bandwidth and provide the variable frequency injection voltage for the receive and transmit mixers. The transmit mixer is supplied via a source follower to provide isolation between the mixers. The output level is approximately 0.3 volt RMS.

TRANSMIT CONVERTER/AMPLIFIER

The transmit mixer uses a pair of 2N5245 FETs in push pull configuration. The 9 MHz SSB signal is fed to the gates in push pull via the input transformer and the 43 MHz auxiliary frequency is fed to the gates in push-push. The DC balance can be adjusted by the potentiometer in the source circuit. The subsequent linear amplifiers amplify the 52 MHz signal to approximately 150 mW into 50 ohms.

TRANSMIT PA

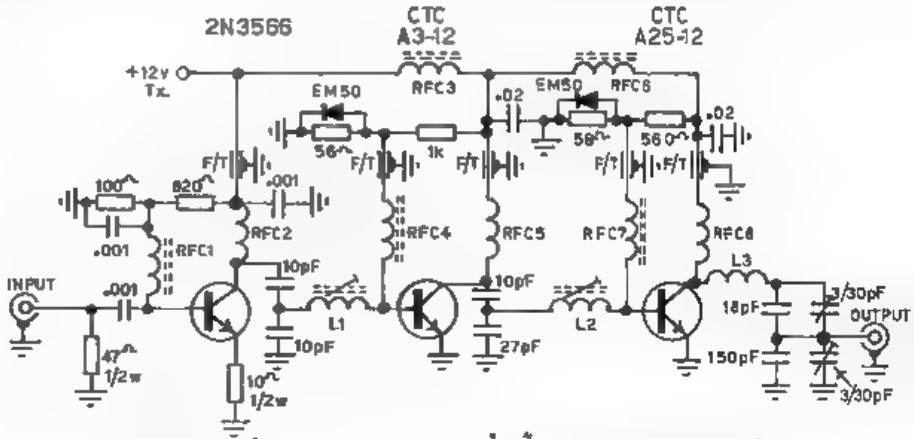
The 150 mW output from the converter/amplifier is coupled to the base of a 2N3866. The standing bias of this stage is set by the base divider and unbypassed emitter networks. The collector coil of the amplifier is resonated by the two coupling capacitors which also provide impedance matching for the base of the following amplifier stage. The driver and PA transistors, CTC A3-12 and A25-12, are available from Varian. The bias arrangement used for these transistors is provided by forward biasing a silicon power diode through a series divider returned to the 12V supply rail. The resistor to ground provides protection if the diode goes open circuit. This system prevents the base/emitter junction from rectifying the drive voltage which results when a conventional divider is used. Interstage and output coupling values were arrived at by optimising the values and then substituting fixed equivalent values. The final can be driven to 24W input which results in an output of around 10W into 50 ohms.

Anyone experimenting with transistor linear amplifiers should remember that care must be exercised when experimenting with interstage coupling capacitors, as the base is not at DC ground as with class "C" amplifiers. A short between the collector of one stage and the base of the following stage will result in the transistor being bowled for a duck from the first ball — definitely not cricket. A wise precaution is to use a DC blocking capacitor when experimenting with variable coupling capacitors.

RECEIVER RF/IF and DETECTORS

The antenna input is tapped onto the input bandpass circuit, which is fed to gate 1 of an MPF121 RF amplifier. Gate 2 is connected to a voltage divider and the RF gain control which is returned to the AGC line. The RF amplifier drain and mixer gate coils form another bandpass circuit. The circuit for the mixer and source follower was taken from the VK3 VHF group 2 metre converter. This circuit was previously used in a home-brew 6 metre converter and handles the job very well in spite of TV Channel O's multi kW signal a couple of hundred kHz away. The variable injection voltage is fed to the source via the link coupling to the source coil. The output of the source follower is fed by a short shielded cable to the input of the 9 MHz crystal filter. The filter output is returned to the receiver board and feeds a three stage IF amplifier using MPF121 dual gate FETs. Interstage coupling is obtained by using bifilar windings, tuned by a capacitator across the secondary. These IF coils are constructed using Neosid formers and cans. The drain of the third IF amplifier is fed via an RFC and coupling capacitors to the AM and SSB product detector.

For improved AGC action, the source is fed via a voltage divider. The Gate 2 voltage of the 1st and 2nd IF amplifiers is supplied from the AGC line. The IF signal



RFC 1. 4T. 26g. Through ½ F 27 slug.
RFC 2. 6T. 18g. ¼" dia
RFC 3,6,2T. 26g. Through F27 slug.
RFC 5,8. 12T. 22g. 5/16" dia.
RFC 4,7. 4T. 33g through Ferrite Bead or ⅛" length of F27 slug.

"F/T" 1000pF Feedthrough capacitors.
L1. 6 T. 22g. NEOSID former F 27 slug.
L2. 8T. 18g. " " F27 "
L3. 8T. 18g. 3/8" closewound.
NOTE. ALL winding wire is "B&S".

FIG.11. Tx. P/A CIRCUIT.

SIDEBAND ELECTRONICS SALES and ENGINEERING

UNIDEN

Model 2020 de-luxe all band AC-DC transceivers	$550
External VFO model 8010 for the 2020	$100
External speaker for model 2020	$25

TRIO-KENWOOD

Model TS-900 de-luxe all-band transceivers, with PS-900 AC supply-speaker unit	$800
Model TS-520 AC-DC transceivers all-band	$530
QR-666 all-band coverage receiver 170 KHz-30 MHz	$300

YAESU-MUSEN

Latest model FT-101-E AC-DC transceivers with genuine RF clipper-speech processor	$650
Model YC-355-D digital frequency counters 0-200 MHz	$250
SPECTRONICS DD-1 digital counter for FT-101-B-E	$150

All UNIDEN, TRIO-KENWOOD & YAESU MUSEN transceivers come complete with original English manuals, all crystals for all available bands and a P.T.T dynamic microphone

HY-GAIN ANTENNAS

14AVQ 10-40 M verticals 19' tall, no guys	$65
18 AVT-WB 10-80 M. verticals, 23' tall, no guys	$90
TH 3 JR 10-15-20 M junior 3 el Yagi 12' boom	$135
TH 6 DXX 10-15-20 M. senior 6 el. Yagi 24' boom	$225
204 BA 20 M monoband 4 el TIGER YAGI 26' boom	$190
HY-QUAD 10-15-20 M. full size Cubical Quad	$200

CDR ANTENNA ROTATORS

AR 22 for 2 and 6 M and small HF beams	$50
HAM-II with re-designed control box	$165
Both models for 230 V AC complete with indicator-control units	
4-conductor light cable for AR-20-22	20 cents per yard
12-conductor light cable for HAM-II	30 cents per yard
8-conductor heavy duty cable for HAM-II	75 cents per yard

BARLOW-WADLEY RECEIVERS

Model XCR-30 Mk II 500 KHz to 31 MHz continuous coverage portable communications receivers, crystal controlled reception of AM-USB-LSB-CW $275

[illegible]

Midland twin-meter model for 52 Ohms, up to 1 KW on HF $22

TEN-TEC

Argonaut New Model 509 5W PEP All Band 12V SSB-CW Transceivers all solid state $300

POWER SUPPLIES

240 V AC to 12V DC 3 A, regulated overload protected $35

MARK MOBILE ANTENNAS

Helical 6' long HW-40 for 40 M	$18
High power KW 40 for 40 M	$25
HW 20 for 20 M	$16
Tri-band HW 3 for 10 15 20 M	$25
Swivel mobile mount & chrome plated spring for all	$12

ASAHI MOBILE ANTENNAS

Model AS 303A set of 5 whips 10 to 80 M. complete with ball spring and mount	$90
AS-2-DW-E ¼ wave 2 M. mobile whip	$8
AS-WW ⅝ wave 2 M. mobile whip	$18
AS-GM gutter clip mount with cable and connectors	$10
M-RING body mount and cap for 2 M. whips	$5

CUSH CRAFT ANTENNAS

Model DGPA 52 to 27 MHz adjustable ground plane	$25
LAC-2 lightning arrestors	$6
Model AR 2 RINGO ⅝ wave verticals	$20
AR-2X RINGO double ⅝ waves verticals	$35
ARX 2 extension for AR-2	$15
A147-20T combination vertical-horizontal 2 M. Yagis, 10 elements each	$60
A147-11 11 elements 2 M. Yagi	$30

CRYSTAL FILTERS

9 MHz similar to FT-200 ones, with carrier xtals $35

FDK MULTI-7

2 M. FM transceivers, 10 W output, now with 12 Aussie channels crystals, 40 to 60, including channels 43 and 45 includes all repeaters 1 to 6 and anti-repeater use $225
Spare Mobile Cradle and Power Cord [illegible]

KEN PRODUCTS

KP-202 2 M hand-held transceivers with 6 channels	$150
KCP-2 charger for KP-202 with 10 NICAD batteries	$35
Stubby flexible whip for KP 202	$6
KP-12A speech processor, self contained 240 V AC	$100

KLM ELECTRONICS

Solid state 12V DC 2 M. amplifier, 12W output, automatic antenna change-over when driven, ideal for mobile use with the KP-202 $50

COAX CABLES — CONNECTORS — SWITCHES

Amphenol PL 259-SO 239	$1.25
3 Position Switch	$8
RG-8 U Foam Insulation Cable ⅜" diam. Low loss	80 cents
RG-58 U Foam Insulation 3/16" diam. Cable, solid core	35 cents
RG-58 U Standard Cable	30 cents

Coax Cable Prices per yard. Add $1 cutting-handling expenses.

P.T.T. MICROPHONES

50 K or 600 Ohm Impedances with 4-pin Japanese plugs $10

All prices quoted are net SPRINGWOOD, N.S.W on a cash with order basis, sales tax included in all cases, but subject to changes without prior notice. No terms nor credit nor C.O.D. facilities, only cash and carry no exceptions. All-risk insurance available for 50 cents per $100 value, minimum insurance charge 50 cents. Allow for freight, postage or carriage, excess will be promptly refunded — Mary & Arie Bles.

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Merry Christmas, 1975, To All --- VK2AVA

The FIVE percent discount on all items listed on the adjacent page still applies to all orders placed and pre-paid before CHRISTMAS 1975 whether for ex-stock or later delivery. Sorry, no more discounts after Christmas 1975 when we close for business until JANUARY 12, 1976.

And now the best news! A new Japanese TWO METER FM transceiver will be available around Christmas time, the all NEW synthesized KYOKUTO DENSHI model FM-144-10 SXR-II. No more crystals required but those installed and delivered with the set, LED read-out of operating frequency.

SPECIFICATION:

FREQUENCY COVERAGE.
Receive . . . . . 144.000 to 148.895 MHz
Transmit . . . . . 146.000 to 147.995 MHz
All above in 5 KHz increments, 400 transmit channels.

COMMUNICATIONS MODE:
Front panel selectable simplex and duplex.
Front panel selectable + and —600 KHz for duplex.

POWER CONSUMPTION
12 to 13.8 V DC 4A transmit, 0.8 to 1 A receive.

DIMENSIONS
2 ½" high, 6 ½" wide, 7 ½" deep. Weight 3 KGs.

TRANSMITTER

RF OUTPUT
10 W high power, 1 W low power, selected by switch on the mike

FREQUENCY STABILITY
0.002 per cent Deviation ± 5 KHz adjustable to max. 15 KHz

MODULATION SYSTEM:
Direct frequency modulation of VCO by varicap.

SPURIOUS RADIATON
Less than 60 DB below carrier level.

RECEIVER

RECEIVER CIRCUIT:
Double conversion superhet 16.9 MHz 1st, 455 KHz 2nd.

RECEIVER SENSITIVITY:
—6 DB, 0.5 microvolt for 20 DB quieting or better

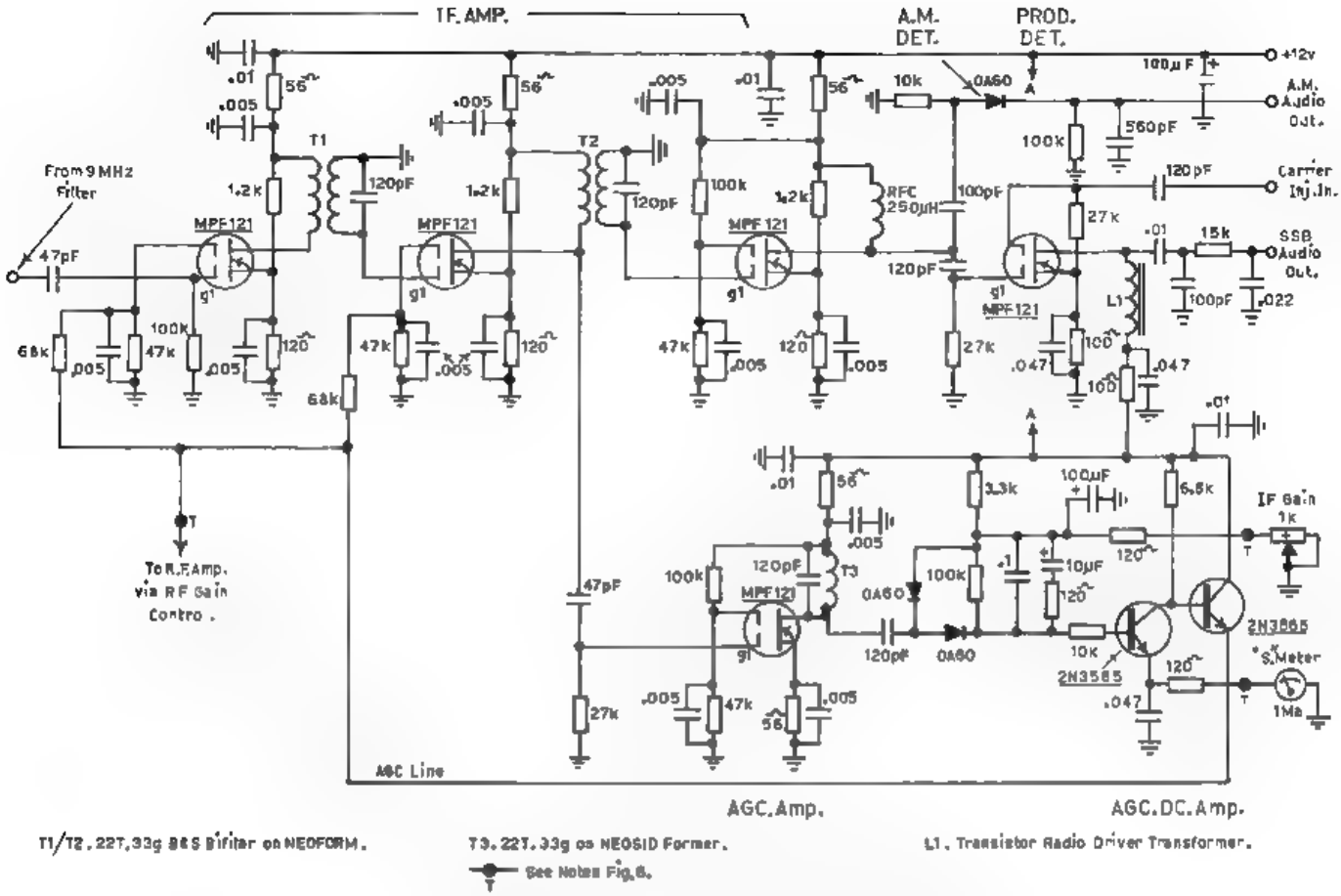
SELECTIVITY.
± 6 KHz at 6 DB down, ± 12 KHz at 40 DB down

AUDIO OUTPUT
4 Watt into 4 ohm load, less than 10 per cent distortion.

STANDARD ACCESSORIES:
P.T.T mike with Hi-Lo switch, powercable with fuse holder, 5A spare fuse, external speaker plug, car mounting bracket, operating manual with circuit diagram.

THE EXPECTED COST WILL BE ONLY $300

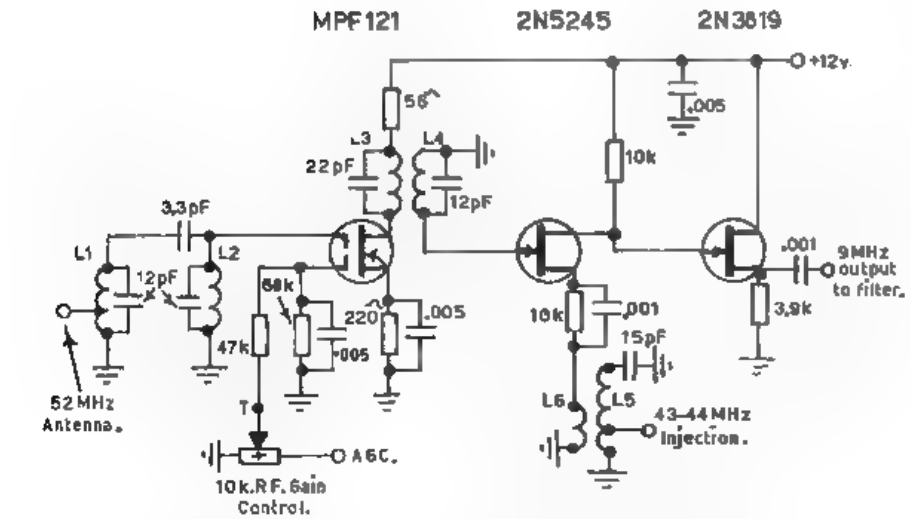
—ARIE BLES, VK2 AVA



T1/T2. 22T. 33g B&S Bifilar on NEOFORM. T3. 22T. 33g on NEOSID Former. L1. Transistor Radio Driver Transformer.

T See Notes Fig.6.

FIG.13. 9 MHz.I.F. and DETECTOR CIRCUIT.



L1 11T Tap 3T
L2 11T
L3 9T
L4 11T
L5 11T Tap 3T
L6 3T (spaced 3T from cold end of L5)

T See Fig 6 Notes. ALL above coils use 26g wire

FIG.12. RECEIVER FRONT END/IF/DETECTOR CIRCUIT.

is picked off from the drain of the second IF amplifier and feeds an AGC amplifier stage employing another MPF121 FET. The drain circuit feeds a voltage doubler rectifier. The DC output is fed to a DC amplifier via a network which determines the time constant of the AGC voltage and provides a means of controlling the bias to the amplifier via the IF gain control. The DC amplifier is biased at cutoff. When the transistor is driven, collector current flows causing the base of the following stage to vary until under full signal input the stage is cut off The AGC line is 12V with no

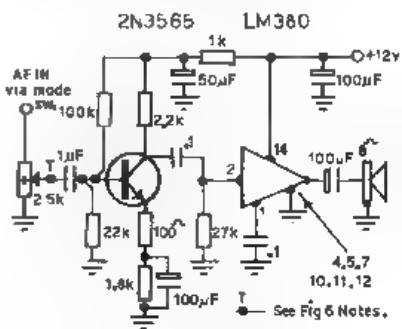


FIG.14. A.F. AMPLIFIER.

YAESU

1	FT-101E	14	FP-200	27	YO-100
2	FT-101B	15	FT-75B/BS	28	FTV-650B
3	FV-101B	16	FP-75B/BS	29	RSE-M-2
4	FL-2100B	17	DC-75B/BS	30	RSL-7
5	SP-101B	18	FR-101D	31	RSL-14
6	FT-501	19	FR-101D DIGITAL	32	RSL-21
7	FP-501	20	FL-101	33	RSL-27/28
8	FT-201	21	FT-224	34	RSL-145
9	FT-401B	22	S-200R	35	FF-50-DX
10	FL-2000B	23	FT-220	36	YD-844
11	FV-401	24	FT-620B	37	YD-846
12	SP-401	25	FP-2		
13	FT-200	26	YC-355D		

NOTE- FT-201 now deleted. FT-101B replaced by FT-101EE and FT-220 replaced by FT-221. Most lines regularly imported.

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bail

ELECTRONIC SERVICES

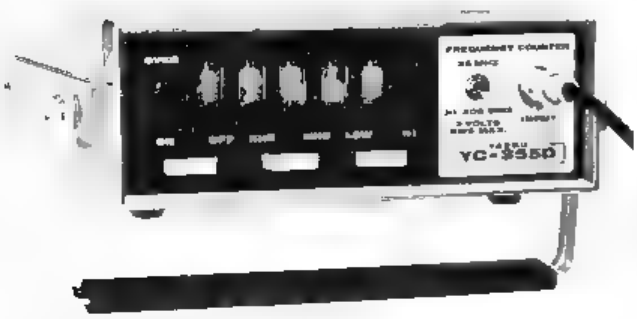
FRED BAIL VK3YS
JIM BAIL VK3ABA

60 Shannon St., Box Hill North, Vic., 3129
Ph. 89-2213

QLD.	MITCHELL RADIO CO. 99 Albion Road, Albion, 4010	Ph. 57 6866
N.S.W.	STEPHEN KUHL, P.O. Box 95, Mosman, 2088	967 1866, AH 371 5446
	W. E. BRODIE, 23 Dalray Street, Seven Hills, 2147	Ph. 624 2001
S.A.	FARMERS RADIO PTY. LTD., 257 Angas St., Adelaide, 5000	Ph. 223 1266
W.A.	H. R. PRIDE, 26 Lockhart Street, Como, 6152	Ph. 60 4379

YAESU MEASURING EQUIPMENT

***From the Sole Australian Agents:* BAIL ELECTRONIC SERVICES**



YC-355D

200 MHz FREQUENCY COUNTER

YAESU offers the active amateur 200 MHz frequency counter at an affordable price. Every complete station should include this versatile counter. The YC-355D utilises advanced IC techniques and a dual range system to provide accurate 8 digit readout to over 200 MHz. Both MHz and KHz indications are selectable over this range. Built-in AC and DC power supplies enable complete portability and double-sided epoxy circuit boards ensure stable and accurate operation with reliability for years to come. The YC-355D is another YAESU product with optimum performance at a reasonable price.

$299

TECHNICAL DATA

Frequency Range: 5 Hz to 35 MHz or 30 to 200 MHz.
Accuracy: ± time base stability ± 1 count.
Display Digits: 8 digits.
Gate Time: 1 milli-sec. or 1 sec.
Indicating Time: 0.1 sec. or 1 sec.
Display Units: KHz and MHz.

Input Voltage: 20mV-20V p-p continuous (60V p-p for 10 sec.), 0.5-2V-rms in the range 30 to 200 MHz.
Input Impedance: 1m ohm or 50 ohm.
Input Capacities: 20 pF maximum.
Clock Crystal: 1 MHz.
Stability: ±0.0005% at 25°C, ±0.0025% at 5-40°C

Aux. 1 MHz Output: 5V p-p.
Operating Temperature: 0-40°C (approx. 30-90°F)
Power Requirements: 100/110/117/200/220/234 V AC 50/60 Hz or 12 VDC.
Size: 220 (W) x 80(H) x 27(D) m/m
Weight: 3.5 Kg.

YO-100

MONITOR SCOPE

Now, you, too, can maintain the cleanest sounding signal on the band with the YO-100 Monitor Scope. Compatible with virtually all transmitters and transceivers, the YO-100 features wide range inputs for all mode monitoring — even RTTY. A built-in 1500/1900 Hz tone generator adds to the versatility of this station accessory. A full compliment of front panel controls allows operator control of all key adjustments. Complete your station with the versatile YO-100 monitor scope.

$185

TECHNICAL DATA

VERTICAL

Sensitivity: 200m V P-P/cm.
Frequency Response: 10 Hz to 40 KHz ±3dB 3180 kHz (455 kHz or 9 MHz inputs optional). Direct 10 Hz to 60 MHz.
Input Impedance: 500 K ohm.

HORIZONTAL

Sensitivity: 300m V/cm.
Frequency Response: 10 Hz to 16 KHz ±3 dB.
Input Impedance: 500 K ohm.
Sweep Frequency: 10 Hz to 10 KHz.

TWO TONE GENERATOR
Frequency: 1500 Hz and 1900 Hz.
Output Level: 50m V
Power Requirements: 100/110/117/200/220/234 V AC 50/60 Hz
Size: 210(W) x 160(H) x 290(D) m/m.
Weight: 6 Kg.

YP-150

DUMMY LOAD/POWER METER

The Model YP-150 can be used as dummy load and power meter within the frequency range of 1.8 MHz to 200 MHz. Three switch selected scales assure accurate power measurement in high and low power range. Built-in fan cools unit for stable measurement.

$88.50

TECHNICAL DATA

Frequency Range: 1.8 MHz-200 MHz
Impedance: 50 ohm unbalanced.
Power Scale: 0-6 watts, 0-30 watts, 0-150 watts.
VSWR: Less than 1.2 at 145 MHz.
Maximum Error: Within 10% of maximum scale.
Size: 104(W) x 153(H) x 280(D) m/m.
Weight: 2 kg.

All prices include Sales Tax. Freight and insurance extra. Prices and specifications subject to change.

BAIL ELECTRONIC SERVICES

ADVANCED AMATEUR COMMUNICATION EQUIPMENT
FROM THE WORLD LEADERS – YAESU

FT-101E TRANSCEIVER: 160-10 Mx, SSB, AM, CW, PA two x 6JS6C, 260W PEP input SSB. Built-in dual AC/DC power supply. BUILT-IN RF SPEECH PROCESSOR. Solid state except for Tx. PA and driver. IF noise blanker, FET Rx RF clarifier, built-in speaker. **$698.**

FT-101EE: Same as above, but without speech processor. **$649.**

M-101 MOBILE MOUNT for FT-101E. **$26.**

FT-200 TRANSCEIVER: 80-10 Mx, PA two x 6JS6C, 260W peak input SSB. Manual, PTT or VOX control, offset tuning, calibrator, operates from a separate power supply. **FP-200:** Yaesu AC power supply for FT-200, in matching cabinet with built-in speaker. Power supply and transceiver. **$448.**

FT-75B TRANSCEIVER: SSB and CW. VOX, noise blanker, squelch. Very small size, transistorised, a superb little rig. 80W PEP. Microphone and five crystals included. **$295.**

FT-75BS: Same as above, but low power for Novice use. Includes three crystals, 3565, 21175 and 27125 kHz. **$276.**

FP-75B/BS AC/DC POWER SUPPLY: 230V for FT-75B. Built-in speaker, power cable and plug. **$74.**

DC-75B/BS DC POWER SUPPLY: 12V for FT-75B. [redacted] built-in speaker, mobile mount, power cable and plug. **$80.**

FL-101 TRANSMITTER: Solid state 160-10m, PA two 6JS6C, all facilities. Companion unit to FR-101. **$515.**

FL-101 SPEECH PROCESSOR: For installation in the FL-101. **$52.75.**

FR-101D RECEIVER: All solid state, 23 bands inc. all amateur bands 160-10m plus 6 and 2m, FM, CW, etc. etc. **$723.**

FR-101D DIGITAL: Has all the options of the FR-101D as well as DIGITAL READOUT. **$889.**

FT-501 DIGITAL READOUT TRANSCEIVER: 80-10m, SSB CW. 500W peak input, includes 2-speed cooling fan, noise blanker, clarifier, VOX and etc. Inc. matching AC PS. **$885.**

FL-2000B LINEAR AMPLIFIER: 80-10m tubes, two x 572B triodes in GG, twin fan cooled. **$435.**

FL-2100B LINEAR AMPLIFIER: Similar to FL-2000B, but styled to match FT-101E. **$435.**

FT-620B SIX METRE SSB AM, CW, TRANSCEIVER: 10W solid state, inc. calibrator and AM filter. **$468.**

FT-221 TWO METRE TRANSCEIVER: Features all mode operation — SSB/FM/CW/AM — with repeater offset capability. 144-148 MHz coverage using advanced phase-locked loop circuitry. **$588.**

M-620/221 MOBILE MOUNT for FT-620B and FT-221 **$26.**

S2000R TWO METRE SYNTHESISED FM TRANSCEIVER: 200 channels, 10W solid state. Simplex, repeater, and priority channel facilities **$435.**

FTV-650B SIX METRE TRANSVERTER: Converts 28 MHz. SSB to VHF, and includes receiving converter. Primarily designed for coupling with Yaesu transmitters and transceivers **$190.**

FTV-250B TWO METRE TRANSVERTER: TBA.

FT-224 TWO METRE FM TRANSCEIVER: 10W, 23 channels, PLUS one priority channel. Includes 8, 50, and one repeater channel, installed (1, 2, 3 or 4). **$248.**

FT-2 AUTO FM TRANSCEIVER: Similar to FT-224, but with addition of automatic scanning facility, etc. Includes 8, 50 and one repeater channel (1, 2, 3 or 4). **$298.**

M-2 AUTO MOBILE MOUNT, for FT-2 Auto **$15.**

YC-355D FREQUENCY COUNTER: 200 MHz. **$299.**

YO-100 MONITORSCOPE: Matches the FT-101E, but can be used with other Yaesu equipment. (IF kits 455 kHz and 9 MHz optional extra). **$195.**

YP-150 DUMMY LOAD/POWER METER: For use over the frequency range 1.8-200 MHz. Three power ranges, 0-6W, 0-30W, 0-150W with built-in cooling fan. **$66.50.**

FF-50DX 3-SECTION LOW PASS FILTER for TVI reduction. **$29.50.**

F-101 FAN. $35.

MATCHING EXTERNAL SPEAKERS for FT-401, FT-101, FR-101. [redacted]

OPTIONAL CRYSTAL FILTERS. $45.

MATCHING VFOs: FV-401, FV-101B, FV-200, each **$120.** FV-50C (for FT-75B). **$71.50.**

YC-601 DIGITAL READOUT for FT-101E and FT-401. TBA

YD-844 DESK MICROPHONE: Yaesu De Luxe PTT Dynamic type with stand. PTT switch. PTT also actuated when lifted from deck. **$39.50.**

RS SERIES HF GUTTER MOUNT MOBILE ANTENNAS: RS Base and Mast (doubles as ¼ wave on 2m). **$16.00.** Coil and Tip Rods: RSL-7, **$14.00.** RSL-14, **$13.00.** RSL21, **$12.** RSL-27/28, **$11.**

As the sole authorised Yaesu agent for Australia, we provide pre-sales checking of sets, after-sales services, spares availability and 90-day warranty.

Quote type and serial number of set when ordering spares. All prices include sales tax. Freight is extra. Prices and specifications subject to change without notice. Allow 50c per $100 for insurance.

BAIL ELECTRONIC SERVICES

COMPLETE RANGE OF ACCESS

HIDAKA Cush Craft SAHI ANTENN

SCALAR ANTENNAS

HF MONOBANDERS

2048A, 4 element 20m, Beam	$194
203BA, 3 element 20m, Beam	$165
VS-20CL 3 elem. W.S. 20m beam, inc. Balun	$154.50

HF DUO BAND

VS-22 3 element 15-11/10m	$116

HF TRIBAND BEAMS

TH6DXX, 6-element trap Beam	$248
TH3Mk3 3-element trap Beam	$199
TH3Jr, 3-element trap Beam	$146.50
HY-QUAD 2-element Quad Beam	$225
VS-33 (Equiv. TH3Mk3) Inc. Balun	$179

NOVICE BEAMS

CB-3 3-element 11m	$47.50
CB-5 5-element 11m	$65.00
Long John 5-element (wide spaced) 11m	$87.50
Eliminator II, 2-element Quad. Sw'ble polarisation, 11m	$85.00
Big Gun II 4-element Quad. Sw'ble polarisation, 11m	$152.00
SDB-6 Stacked 6-el Beam (3 + 3)	$128.00

HF VERTICALS

VS41/80KR 10m thru 80m, Inc. 11m	$80
14AVQ, 10m thru 40m trap Vertical	$67.50
18AVT, 10m thru 80m trap Vertical	$98.50
12AVQ, 10m thru 20m trap Vertical	$48
18V 10m thru 80m base loaded Vertical	$35
18HT 10m thru 80m Tower	$275
VS-RG Radial Kit for VS-41/80KR	$22.50
Golden CLR-2 ⅝ wave, 11m heavy duty G.P. 4 dB	$59.00
CLR-2 ⅝ wave, 11m G.P.	$45.00
GPGP ¼ wave, 11m G.P.	$23.00
GOLDEN ROD ½ wave, 11m 3.75 dB	$35.00
CR-1 ½ wave Ringo, 11m 3.75 dB	$39.00

HF MOBILE WHIPS AND FITTINGS

HY-GAIN NOVICE MOBILE ANTENNAS

HELL CAT 3 35" Magnetic base, 11m	$33.00
AQUA CAT 108" Marine, 11m (no ground plane req'd.)	$69.00
HELL CAT 9, 58" Marine (no ground plane req'd.), 11m	$36.50
W-102 102" S.S. Whip	$15.55

SCALAR MOBILE WHIPS

M-22T ¼ wave 2m whip top	$5.95
M-25T ⅝ wave 2m whip top	$15.00
M27-R60T 5ft. 11m C.L. whip top	$18.50
M-35T 4.5 dB Gain, 435 MHz S.S. whip top with spring	$16.00
M.B. Standard base	$4.20
MAGBASE inc. 12ft. of RG-58/AU	$30.00

ASAHI

AS-303A HF Mobile Antenna set, centre loaded type 3.5-27/28 MHz, 400 W PEP, consists of common mast 4'6", telescoping to 2'6" for convenient stowage, five interchangeable loading coils with tip rods, and adjusting spanners inc., making a total height of approx. 7', with HD spring and ball mount. Beautifully engineered, feeds direct with 50 ohm co-ax. The complete set a steal at **$108.**

AS-NK matching SS Bumper Mount Adapter, for AS303A, $14.

MAGNI MOUNT

Helical:

HW-80-6 80m, 6 ft.	$49	HW-15, 15m, 4ft.	$24.00
HW- 80, 80m, 6ft.	$39	HW-11, 11m, 4ft.	$24.00
HW- 40, 40m, 6ft.	$28.50	HW-11, 11m, 6ft.	$25.50
HW- 20, 20m, 6ft.	$25.50	HW-10, 10m, 4ft.	$24.00

FITTINGS: (Suit all makes with ⅜" x 24 thread)

BPR, bumper mount	$18
BDYF, heavy duty adjustable body mount	$15
HWM-1, fixed body mount	$14
SPG, heavy duty spring	$11
SPGM, light duty miniature spring	$8
Asahi AS-KRB, flat roof mounting adapter for vertical trap antennas	$15
C30-32 Ball Mount & Spring	$18

VHF ANTENNAS

HY GAIN

23, 3-element 2m Beam	$19.00
28, 8-element 2m Beam	$38.00
215B 15-element 2m super-beam	$69.00
GPG-2 2m ⅝ wave ground-plane	$27.50
64B 4-element 6m beam	$49.00
66B 6-element 6m beam	$79.00

CUSH CRAFT

ARX-2 three half wave 6dB gamma loop matched vertical	$40.00
ARX-450, 435-450 MHz three half wave 6dB Ringo	$36.00
AR-6, 6m ½ wave Ringo 3.75 db	$36.00
A144-7, 7-element 2m Beam	$25.00
A144-11, 11-element 2m Beam	$35.00
A144-20T, 20-element 2m "Twist" Beam	$72.00
A50-3, 3-element 6m Beam	$37.00
A50-5, 5-element 6m Beam	$57.00
A430-11, 11-element 430 MHz Beam	$25.00

VHF MOBILE ANTENNAS

HY-GAIN

265 ⅝ wave Magmount for 2m, inc. co-ax	$41.00
270 Double stacked ⅝-wave fibreglass whip for 2m	$45.00
271 Mount for 270	$6.00

ASAHI

AS-2HR, ⅝-wave SS 2m gutter mount, inc. co-ax.	$45.00
AS-2P40 as above, but fibreglass whip	$36.00
AS-2HRF ⅝-wave cowl mount type	$42.00
AS-6RD 6m centre loaded SS whip with gutter mount	$22.50

BAIL ELECTRONIC SERVICES

ORIES FROM BAIL ELECTRONICS

HI-MOUND

STANDARD VHF TRANSCEIVERS

SR-C146A, 2m hand held 5 chan. 2W transceiver, inc. carrying case and 3 chs. **$162.00**

SR-C432A, 70cm hand held 6 chan. 2W transceiver, inc. carrying case and 1 chn (435 MHz) **$239.00**

SR-C430 70cm 12 chan. 10 watt mobile transceiver inc. 1 ch (435 MHz) **$275.00**

STANDARD ACCESSORIES

CMP08 Hand mic. for SR-C146A and SR-C432A **$18.50**
CAT08 Rubber antenna (helical) for SR-C146A **$8.00**
Heavy Duty Carrying Case for hand held units **$13.50**
AC Adapter and charger for hand held units **$32.50**
Mobile Adapter for hand held units **$11.50**
AC Charger only **$9.00**

BALUNS

HY GAIN

BN-86, broad-band ferrite Balun, 2 kW for Beams and Doublets **$25.00**
BN-27A as above especially for 11m **$23.00**

ROTATORS

CDR

Ham II, 230 V AC **$189.50**
CD-44 Medium duty rotator, 230 V **$129.00**
AR-22L Light, low cost rotator, 230 V **$65.00**
Cable, 8 Conductor, for Ham II CD-44 **75 cents yd.**

ANTENNA ACCESSORIES

HY GAIN

LA-1, Lightning Arrestor, for installation in standard 52 or 72 co-axial feedline, designed to Mil. specs. **$39.00**
LA-2, smaller size co-ax arrestor **$9.75**
421A, Power meter, 3-60 MHz, reads SWR, power on 10, 100 & 500 W scales, and AM modulation percentage. Especially made for Novice & Marine 11m use **$48.00**
421B, Similar to above but with 20, 200W and 2kW Scales **$58.00**
KW TVI filter 5 Section, SO-239 connectors. A superior job with excellent attenuation **$48.00**

Q CRAFT

Porcelain Egg Insulators **20 cents**
WIDE RANGE of Co-axial cable and connectors in stock.
K-20 70 ohm Twin feeder **27 cents per yd.**

KW ELECTRONICS

Multi-band dipole traps with ceramic "T" centre insulator, 80-10m bands per pair complete with insulator **$26.50**
Co-axial cable switch, 3 positions **$24.00**

B & W

Co-axial cable switches, 5 position, Model 590G **$25.00**

SWR METERS AND DUMMY LOADS

Q CRAFT

SWFS-2, single meter type, combined SWR and FS meter, 50 ohms, inc. FS pick-up whip, size 5" x 2" x 2¼". 3-150 MHz, UHF connectors **$16.50**
SWR-2, dual meters, 50 ohms. Simultaneous reading of forward and reflected power, 5' x 2" x 2¼". 3-150 MHz, UHF connectors **$24.00**
SWR-200 large dual meters, switched 50-75 ohms, with calibration chart for direct power readings to 2 kW in three ranges. A very elegant instrument. 7⅝" x 2¾" x 3¼" **$29.00**

KW ELECTRONICS

Z Match Antenna Couplers, 80 metres to 10 metres. Beautifully finished in communication grey (see review "QST" July, 1972).—
KW E-Zee Match, screw terminals at rear, size 5½" x 6" x 12" **$76.50**
KW-107 Supermatch, as above with addition of SWR meter, power meter with large 50 ohm dummy load to read up to 1 kW PEP, UHF sockets at rear. A superb piece of equipment, 7" x 8" x 13" **$169.00**
KW-109 High power version of KW-107, larger condensers and coils **$245.00**
KW-103 SWR Power Meter uses toroidal coil pick-up for continuous operation 52 ohms 1 kW max. to 30 MHz SO239 UHF sockets very accurate **$55.00**
KW Dummy Load 52 ohm Air Cooled. Will handle up to 1 kW (ideal for use in workshop or field) **$39.50**

HEATH KIT

HN31 Centenna Kit 1 kW oil cooled (oil not included) **$31.00**

OTHER ACCESSORIES

AT-3 RF actuated CW Monitor and **Code Practice Audio** Osc. uses 4 transistors, 2 diodes, with built-in speaker and tone control. Requires one UM3 penlite cell. In grey metal case, 2" x 3¼" x 3½" **$16.00**
EKM-1A Audio Morse CP Osc with speaker, one transistor. Headphone socket and tone control, requires one UM3 cell. In metal case 3⅛" x 2½" x 1⅛" **$9.50**
TC-701 Morse Practice Osc with built-in key and spkr. Inc. battery and auxiliary earpiece. Copy of morse code on case. Two can be wired together to form a practice communication set **$16.50**
MC-701 Mic. Compressor, battery operated. Available with 4 pin mic. connector **$45.00**

MORSE KEYS

EK-108A Electronic keyer, super quality, IC with dot memory. Built-in monitor & paddle. Solid state "relay". 230 V AC **$79.50**
EK108D, DC, same as EK108A but takes 2 size 'D' cells **$72.00**

HI-MOUND

HK-701 De luxe heavy duty morse key. Heavy base. A really beautifully constructed and finished unit. Fitted with a dust cover, standard knob and knob plate **$26.00**
HK-706 Economy key, all black ABS resin base and chromed mechanism **$9.95**
HK-707, Similar to above but with dust cover and standard knob **$15.00**
HK-808, Commercial hand key with ball race pivots, heavy poly marble base and plastic dust cover **$45.00**
MK-701 Side Swiper key to actuate Electronic keyer **$27.00**
BK-100 (BUG) Semi-automatic bug key, full adjustable **$35.00**

MONITOR RECEIVERS

SC101, Automatic scanning receiver, 4 VHF chns., 4 UHF chns. RF stages, tuned to 146 and 435 MHz **$135,** Xtals extra.
MR-2, Mini Monitor, 12 ch. pocket receiver VHF. **$98,** Xtals extra

Also available: Equipment for novice and Marine use on 11m band. Antennas, beams, Walkie Talkies, base stations, and accessories. Digital clocks, SSTV, Generator noise filters.

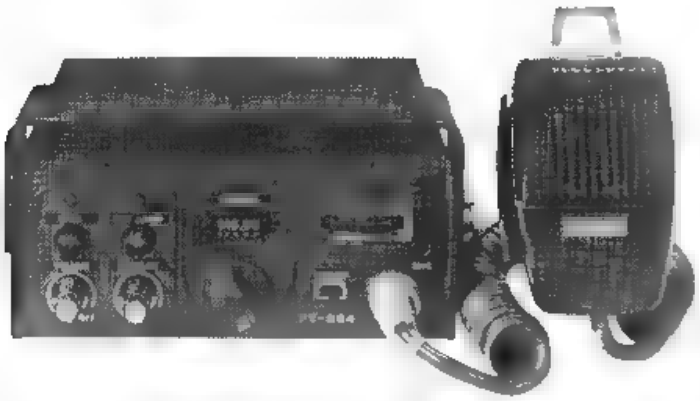
Servicing facilities for all types of Amateur and Novice equipment. We check all sets before sale and provide a 90 day warranty.

All prices incl. S.T. Postage and freight extra. Prices and specifications subject to change without notice. Availability depends on stock position at time of ordering.

BAIL ELECTRONIC SERVICES

YAESU VHF FM TRANSCEIVERS FROM THE SOLE

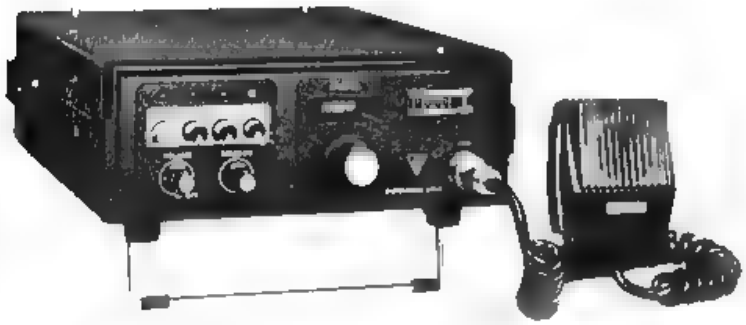
FT-224



● 24 Channel FM Transceiver

Join the action on FM - the "Fun Mode". The FT-224 is an advanced, solid state transceiver, that features 10 Watts and 23 channel flexibility plus one priority channel, all in one compact package. The FT-224 includes a built in tone burst for repeater actuation and three popular channels installed. Additional plus features includes automatic high VSWR protection of the final output transistor, and reverse power line polarity protection. The FT-224 comes complete with a built-in speaker, mobile mounting bracket, and dynamic microphone.

Sigmasizer-200R



● 200 Channel Synthesized Transceiver

YAESU now offers the FM enthusiast a complete, solid-state, 200 channel 2 Meter FM transceiver. The Sigmasizer-200R features advanced, synthesized circuitry for total repeater and simplex coverage of the 144 to 146 MHz or 146 to 148 MHz FM band. Frequencies are selectable in 10 KHz increments and front panel selectable ±600 KHz transmitter offset oscillators give complete flexibility for repeater operation. A built-in tone burst oscillator is included for activation of tone coded repeater systems. A priority channel may be preset for instant selection of

FT-221

● Solid State 2 Meter Transceiver with Versatile SSB/FM/CW/AM Operation

Features

- Complete 144-148 MHz coverage in 8 band segments
- Dual rate, concentric VFO dial drive with better than 1 kHz readout
- Built-in AC & DC power supplies
- SSB/CW/FM/AM operation
- Selectable ±600 kHz repeater offset
- Built-in VOX and break-in CW
- External tone input connector
- Built-in 100 kHz calibrator
- Built-in effective noise blanker
- Three way metering: S meter, power output, and FM discriminator
- 11 crystal channels per band segment = Total 88 channel
- SSB output 12 watts PEP
  FM/CW output 14 watts
  AM output 2.5 watts
- Built-in speaker

Prices Include Sales Tax. Freight and insurance extra.

Prices and specifications are subject to change.

All sets are pre-checked before dispatch and are covered by our 90 Day Warranty.

AUSTRALIAN AGENTS – BAIL ELECTRONIC SERVICES

You, too, can enjoy the action on FM with your own FT 224

TECHNICAL DATA

GENERAL

Frequency Range:
146 to 148 MHz
Number of Channels: 23 plus 1 priority channel
Mode. FM
Frequency Stability: ± 0.001%
Antenna Impedance: 52 Ohm unbalanced
Circuitry: 30 Transistors, 23 Diodes, 4 IC, 5 FET
Power Source: 13.5 VDC
Power Requirement: 0 4 A receive, 2 2 A transmit (DC)
Size: 180(W)x70(H)x220(D) m/m.
Weight: 2.5 Kg.

RECEIVER

Sencitivity: 0.3 μV for 20 dB quieting
Selectivity: 15 KHz at 6dB, 25 KHz at 60dB
Audio Output: 2.5 Watts at 4 Ohm

TRANSMITTER

RF Output Power: 1 or 10 Watts.
Spurious Radiation: -60 dB better than 60 dB.
Deviation: ±5 kHz nominal.

PRICE $246

FP-2

AC POWER SUPPLY FOR HOME OPERATION

The FP 2 can be used w th the FT 224 or Sigmasizer-200R supp y ng regu lated 13.5 V DC Prov sion has been made for instal ation of opt onal colloid batter es which are automati cally charged, and connected when the AC supply stops The co oid batteries last approximately 10 hours Conta ns a 80 x 120 m m speaker

Output: 13.5 V DC, 2 2 A maximum.
Power Requirement: 100/110/117/ 200/220/234 V AC, 50/60 Hz, 35 Watts
Size: 160(W) x 120(H) x 230(D) m/m
Weight. 4 Kg.

your favorite channel. Automatic final protect.on against high VSWR is another total performance feature of th s outstanding transceiver

TECHNICAL DATA

GENERAL

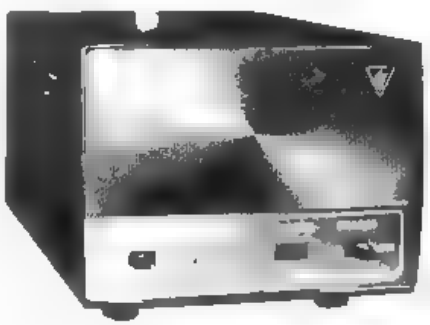
Frequency Range:
146 to 148 MHz
Number of Channels: 200 (10 KHz intervals) Simplex and ±600 KHz TX offset for Repeater operation.
Mode: FM.
Frequency Stability: ±0 001%.
Antenna Impedance: 52 Ohm unba anced
Power Source: 13.8 V DC (negative ground)
Power Requirement: 0 45A receive, 2 2A transmit
Size: 220(W)x80(H)x230(D) m/m
Weight: 3 Kg.

Sensitivity: 0.3 μV for 20 dB quieting
Selectivity: ±8 KHz at 6 dB, ±16 KHz at 60 dB
Audio Output: 2 Watts at 4 Ohm

TRANSMITTER

RF Output Power: 1 or 10 Watts.
Spurious Radiation: -60 dB minimum.
Deviation: ±5 KHz nominal.

PRICE $435 (two only, special at $390)



PRICE $69

TECHNICAL DATA

GENERAL

Frequency Range: 144.00 to 148.00 MHz in eight 500 kHz segments.
Mode: SSB (selectable USB or LSB), AM, FM or CW.
Frequency Stability: Within 100 Hz during any 30 minute period after warm-up Not more than 20 Hz with 10% line voltage variation
Calibration Accuracy: 1 kHz maximum after 100 kHz calibration.
Backlash. Not more than 50 Hz.
Antenna Impedance: 50 ohm unbalanced nominal
Power Requirement. 100/110/117/ 200/220/234 V AC, 50/60 Hz, 100 VA maximum or 13.5 V DC, 3A transmit maximum (11.5 – 16.5 V DC).
Size: 208 (W) x 125 (H) x 295 (D) mm
Weight: 8.5 kg.

RECEIVER

Sensitivity: 0.5 μV for 10 dB Noise plus Signal to Noise Ratio on SSB/CW 1.0 μV for 10 dB Noise plus Signal to Noise Ratio with 400 Hz 30% modulation on AM. 0.75 μV for 20 dB quieting on FM.
Selectivity: 2.4 kHz nominal bandwidth at 6 dB down, 4.1 kHz at 60 dB down on SSB/CW/AM. ±6 kHz nominal bandwidth at 6 dB down, ±12 kHz at 60 dB down on FM.
Harmonic & Spurious Response: Image Ratio better than 60 dB
Audio Output: 2 Watts to nternal or external speaker at 4 ohm impedance
Squelch Threshold. Less than 0.3 μV
I.F. Frequencies: SSB/AM/CW 10.7 MHz, FM 10 7 MHz and 455 kHz

TRANSMITTER

Spurious Radiation. -60 dB.
Frequency Response: Balanced SSB 300 to 2700 Hz +3 dB Low power AM better than 60%. Variable reactance FM +5 kHz maximum
Carrier Suppression: –50 dB
Sideband Suppression: –50 dB.

PRICE $588

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Alignment Lines in YAESU's Fukushima Factory.

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signal input and almost zero under full signal input. With the gate 2 and source dividers values used, the resulting gate 2 vo tages on the controlled stages will vary from about 4.5V with no signal to —1.2V under full input.

AM detection is accomplished by an envelope detector capacitively coupled from the drain of the 3rd IF amplifier. SSB demodulation is obtained by a product detector using another MPF121 dual gate FET The 9 MHz carrier is fed to gate 2 and the IF signal to gate 1. The drain inductance is a transistor radio AF choke.

AF AMPLIFIER

The mode selector switch feeds the required detector output to the AF volume control which is then coupled to a 2N3565 AF pre-amplifier. The collector is capacit vely coupled to the input of the I/C power amplifier (LM 380), which drives an 8 ohm speaker.

CONSTRUCTION

Construction will largely depend on personal ideas and preferences. The author used a Horward instrument cabinet type H84-12-VA which measures 12 x 8 x 4 inches. These neat cabinets have a heavy aluminium front and rear which double as heat sinks, the power supply 2N3055, transmitter driver, and P/A being mounted on the rear panel. A sub-chassis is fitted about 1⅜ in. up from the bottom to provide mounting of the modules etc. The following modules are mounted underneath; SSB generator receiver, front end/IF/detector, Transmit mixer and auxiliary oscillator/amp. The VFO and power transformer are fixed to the top of the chassis. Also mounted on the top but with the boards vertical are the AF Amplifier, power supply and Tx P/A boards. The modules mounted flat on the chassis are stood off by ¼ inch stand offs.

FINAL COMMENTS

It is not envisaged that this rig would be copied entirely as described, but provide ideas for anyone contemplating a similar project. Therefore a detailed alignment procedure is not included. However the following hints may be helpful.

Alignment of the bandpass circuits is best carried out using a sweep generator. Alternatively the alignment can be carried out by varying the VFO frequency and changing ranges, carrying out alignment for a constant output voltage. As it is becoming increasingly easier to obtain access to frequency counters, the adjustment of the crystal and VFO frequencies is best carried out by this method.

As the development of a large project such as this takes many years, new components become available which outperform others used in the early stages of development. A really dedicated experimenter would scrap circuits and components and start again! Fortunately, work on the receiver was not started before MPF121s became available, and no doubt more of these devices would have been used in other circuits had they been available earlier.

Finally, the author would like to thank those who made helpful suggestions during development, also the many who assisted during on-air testing. ■

FIXED CHANNELS FOR THE FT200

George Francis VK3HV
31 Donald St., Morwell, 3840

Here is an idea for FT200 enthusiasts. Fixed channel operation is often useful for:

(a) Regular net calling and listening, e.g., Zone nets, beacon frequencies, national calling frequencies.
(b) Civil Defence and Emergency use subject to approval by the relevant authorities).
(c) (Quick, accurate, eyes-on-the-road frequency changes while mobile — Ed.)
(d) Split frequency HF DX operation and VHF operation.

Although a fixed channel option kit can be purchased, readers may prefer to build their own unit for installation inside their FT200 (earlier models), or for mounting in an external case (later models). The earlier models had provision for selection of VFO or from fixed channels via a front panel switch but later models have an internal/External VFO switch.

The circuit suggested (Fig. 1) is similar to that used by Yaesu and although not tested by the author, it would be easy to build and should not give any difficulties. The switch S1 may be the internal channel selector switch and one of the constructors choice. A swing of about 1 kHz when using the clarifier may be expected when using HC-6/U type crystals (parallel resonance).

To calculate the required crystal frequency, use the Difference Frequency Table.

Example 1. Required frequency 7099 kHz using LSB. From chart below the difference frequency is 2001.5 kHz, therefore 7099 — 2001.5 = 5097.5 required xtal. frequency.

Example 2. If 21420 kHz is required using USB, then 26498.5 — 21420 = 5078.5 kHz crystal required. Note bands 3.5, 21, 28, 29.5 use difference frequency minus required frequency. Bands 7 and 14 required frequency minus difference frequency. ■

DIFFERENCE FREQUENCY TABLE

Band	Normal	Rev	AM/CW
3.5	9001.5 (L)	8998.5 (U)	9001.5 (N)
7	2001.5 (L)	1998.5 (U)	1998.5 (R)
14	8998.5 (U)	9001.5 (L)	9001.5 (R)
21	26498.5 (U)	26501.5 (L)	26498.5 (N)
28.0	33498.5 (L)	33501.5 (L)	33498.5 (N)
28.5	33998.5 (U)	34001.5 (L)	33998.5 (N)
29.0	34498.5 (U)	34501.5 (L)	34498.5 (N)
29.5	34998.5 (U)	35001.5 (L)	34998.5 (N)

L — LSB
U — USB
N — NOR
R — REV

Frequencies in kHz

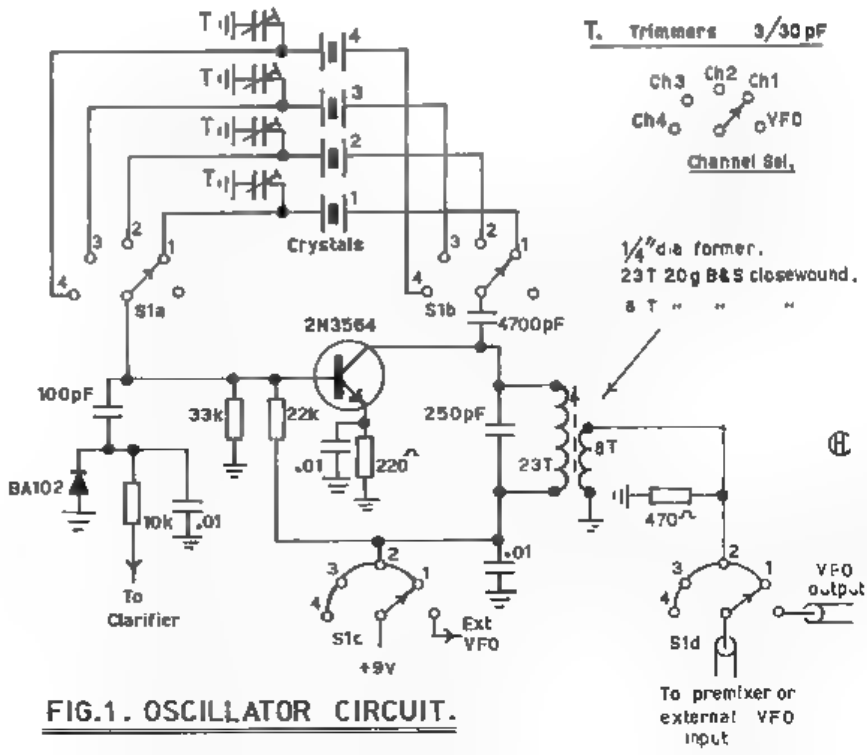


FIG.1. OSCILLATOR CIRCUIT.

A BEGINNER'S GUIDE TO THE 6 METRE BAND

Geoff Wilson VK3AMK
7 Norman Ave., Frankston, Vic 3199

Firstly, what is the Six Metre Band? It is the lowest frequency VHF band available for amateur use and in VK at present covers 52-54 MHz. This is the upper half of the international 6 Mx band which is 50-54 MHz (as used in the USA, Japan, etc.).

Unfortunately at present the lower 2 MHz in Australia is part of TV channel 0. In New Zealand the 6 Mx band is from 51-53 MHz with the lower 1 MHz (50-51 MHz) forming part of their TV channel 1.

Being a VHF band it is different from the normal HF bands in that most of the time VHF propagation characteristics apply but it is also low enough in frequency to be influenced at times by the same factors which affect HF bands and this can produce extremely interesting VHF DX paths. Under the right conditions this can enable the Limited Licensee to work beyond VK which is normally impossible other than via Oscar on 2M

Conditions vary considerably with the time of the year and the time of the sunspot cycle etc. but the constantly changing nature of the band is one of its most interesting aspects There are probably more modes of propagation found in the 50 MHz region than on any other single Amateur band. From this point of view alone 6 Mx is a very useful starting point for anyone wishing to experiment with propagation or equipment.

This is one band where quite modest equipment can be very effective indeed, for example many JA stations are worked from VK (especially the northern areas such as VK4) and the power limit on the 6 Mx band in JA is 50 watts. Many of the JAs run 20 watts or less yet still produce strong signals even in the southern parts of VK when the band opens up. For working within VK even 5 or 10 watts is often adequate provided a good antenna is used but naturally higher power is helpful at times when conditions are difficult.

Currently the most popular modes used on the 6 Mx band are SSB (in the section 52.0-52.5 where tunable operation takes place) and FM (mainly on the Internationally recognised frequency of 52.525). In addition there are other FM and AM net frequencies but these are used on a regional or local basis. At present there are no FM repeaters in VK on the 6 Mx band. Simplex FM operation while useful has definite limitations especially if the band opens and many stations want to work DX. It is preferable to be able to operate tunable equipment for DX working and SSB has now become almost the exclusive mode for this although a few AM and CW stations remain active too.

Equipment can either be built or purchased ready made. There are now a number of transverters available for use with commercially built transceivers used on HF, and separate 6 Mx transceivers are available. For those interested in building their own equipment a 6 Mx transverter is a fairly simple and very enjoyable project which any Amateur should be able to produce. Numerous good circuits are available in the various Amateur technical publications.

In most VK call areas beacons have been established on the 6 Mx band to study propagation and indicate band openings, especially in the more remote areas where local activity is not normally very high. (Refer to the "VHF UHF an expanding world" column for the current beacon list). In addition TV channels 0 and 1 in VK, and channel 1 in ZL, despite their higher ERP, are good indicators of likely 6 Mx openings.

The most common and possibly spectacular form of propagation found on 6 Mx is Sporadic E reflection. This carries the bulk of 6 Mx traffic within VK and peaks usually from November to January (summer DX "season") and to a lesser extent from May to July (winter DX "season"). It can and does occur at other times throughout the year, providing signals of varying strength, sometimes as good as summer peaks and others much weaker. Sporadic E signals are usually very strong (often DX signals will be stronger than even local stations within a mile or so) and the best skip is approximately 1,600 Km but it may be more and it can also be considerably less. These signals are reflected from clouds in the Sporadic E layer at a height of 60 to 100 Km above the earth and may produce a path giving single or double hop from the point of transmission to the point of reception. A typical opening would be from say Melbourne to Brisbane or Townsville around 10 am local time during December with signals peaking to S 9 plus. On this path it would be likely to open perhaps two days out of three at this time but the chances of this happening vary from season to season. The actual opening may last from a few minutes to several hours or more and may be repeated late in the afternoon or early evening. In the meantime the band may have opened to many other areas in a random fashion. Often a few watts is adequate to work these openings and all VK and ZL call areas as well as the closer Pacific countries can be worked on Sporadic E.

Other forms of 6 Mx propagation include:

Scatter

Forward scatter signals are scattered by the E layer giving paths up to 2200 Km or so or scattered by the troposphere at about 9 or 10 Km and giving paths up to 800 Km or so. Backscatter occurs where signals are reflected back into what would normally be the skip zone, this includes paths of 500 Km or less beyond the ground wave and short of the point where the sky wave returns to earth. Most scatter signals are weak compared with Sporadic E.

TEP (trans-equatorial propagation)

The typical path for this mode is Tokyo — Rockhampton etc. where seasonal propagation occurs between places roughly equally spaced either side of the magnetic equator

F2

This mode provides the really long haul DX by multiple hop up to distances of almost 20,000 Km such as JA to LU etc mainly during solar peaks.

Auroral reflection

By aiming the antennas at each end at the southern polar regions signals can be reflected from auroras but, as these occur only basically in the higher latitudes on a regular basis during the sunspot peaks, the possibilities in VK are limited. Southern ZL is better situated for this particular mode which is usually characterised by rapid flutter or buzzing on the signals.

Meteor reflection

This mode depends upon ionized areas formed as a result of meteors striking the upper layers and reflects signals for periods from fractions of a second to half a minute or more.

Provided a stable tranamitter and receiver is used in conjunction with an antenna having reasonable gain located well in the clear there is no reason why plenty of DX shouldn't be worked when conditions are right. A typical 6 Mx station today consists of a high frequency transceiver with an outboard transverter running about 50 watts PEP to a 5 element yagi about 10 Mx high.

Admittedly problems exist in Ch 0 TV areas, both with QRM from the TV transmitters and with TVI which, unlike HF TVI problems, has no simple solution However, despite the TVI problem, Melbourne remains one of the most active areas on 6 Mx in VK and probably has more or at least as many stations active on the band as in Sydney where there is no TVI problem Each TVI situation is different, depending upon local signal levels, antenna height above the surrounding houses, power level used etc. SSB has proved probably the best solution to TVI in as much as power levels can readily be reduced when conditions are good. This is much more desirable than running unnecessarily high power when the band is wide open, often 1 watt or less is sufficient to give very effective communication.

For those who have never operated 6 Mx

why not give it a try? It can be a very rewarding, if at times frustrating, band. For those who may have operated on 6 Mx many years ago but closed down when TV started, how about building a transverter to use with your HF transceiver? There is plenty of room in which to operate as the CW/AM/SSB section on the low end is greater than the whole of the 20 Mx band. Most activity is found around the SSB calling frequency of 52.050 and a call on that frequency will bring a reply if anyone is about.

The 6 Mx band has the reputation of being the friendly band, most operators are only too willing to give any help or advice to the newcomer. Apart from having many enjoyable QSOs any additional stations active on the band will go a long way towards helping to retain what I consider to be our most interesting band ■

A SIMPLE TOP BAND TRANSMITTER

J. Wallich (ex VK3ANY)
36 Darnley Ave. Gordon 2072, NSW

This easy to build transmitter can be built from the average junk box in two weekends. Input power can be 10 to 20 watts depending on the power supply. This is adequate to give a large signal over hundreds of miles when conditions are reasonable, even with a modest antenna.

The transmitter uses conventional circuitry with valves throughout. The current drain is sufficiently moderate for the rig to be used as a mobile or portable station. As the individual constructor will want to use the components he has on hand, detailed constructional information is not given here.

This rig is used in conjunction with the transistorised top band receiver described previously by the author.

The VFO operates on 1.8 MHz and drives the final via an RC coupled buffer. Coils L1 and L2 are wound on ¼ inch diameter formers. They are therefore long coils. To achieve best stability of the VFO, a negative TC capacitor of 3 x 10 pF (C1) is enclosed in the coil can of L1. The constructor will find it fairly easy to select the right value by trial and error testing, using a hot soldering iron as a heat source. A very good degree of stability for this band can be achieved.

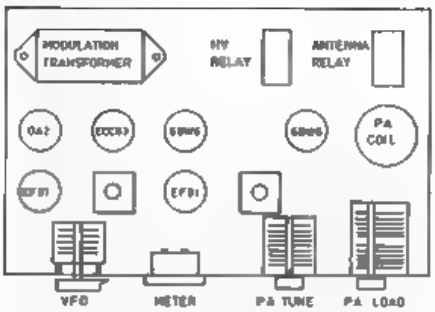


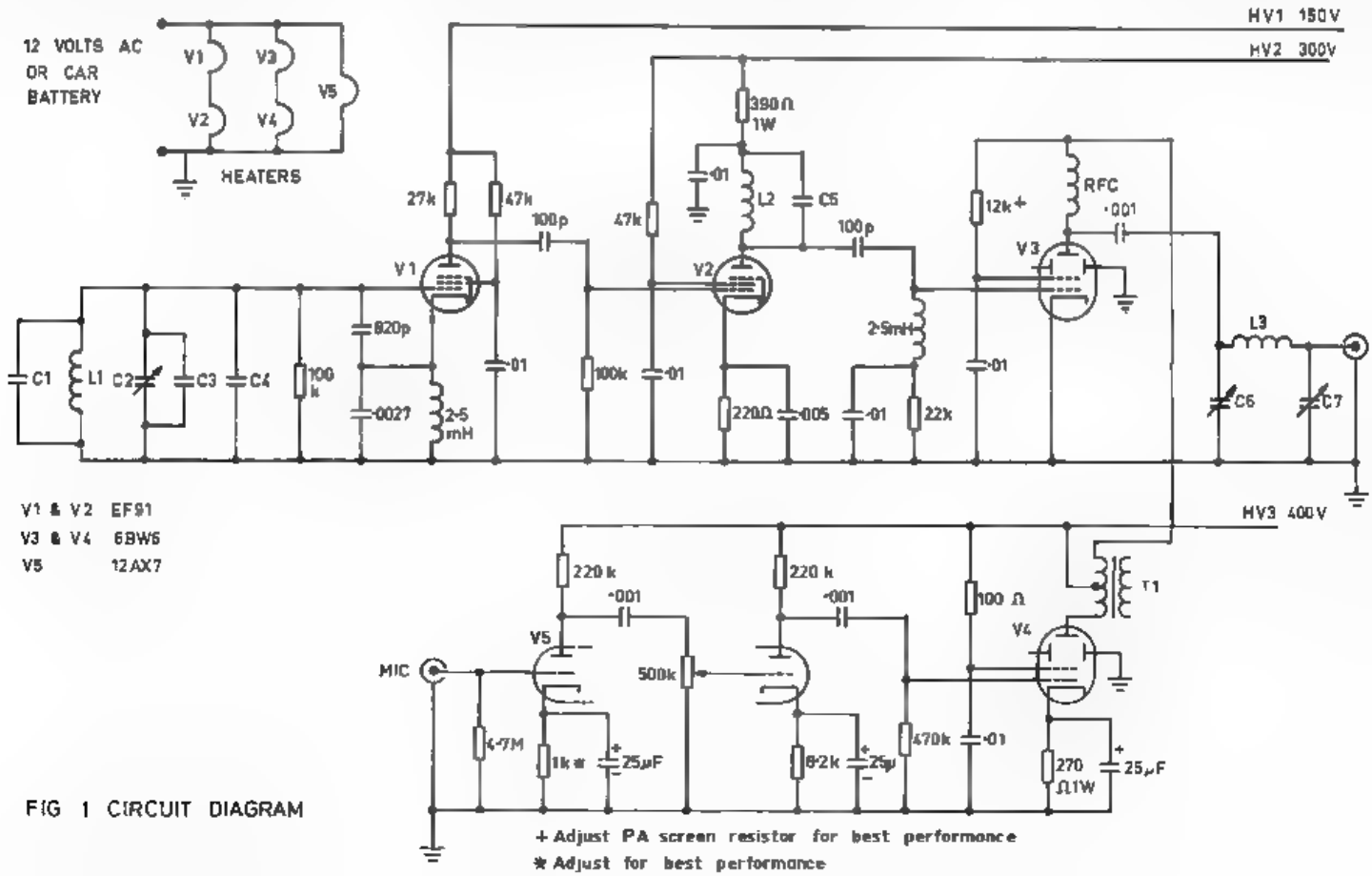
FIG 2 MAJOR COMPONENT LAYOUT OF TRANSMITTER

The VFO tuning capacitor C2 should be about 50 pF to cover the band. A slow motion drive is recommended.

The PA tank is wound on a 1¼ inch diameter PVC tubing obtained from a plumber. It consists of 24 turns of 20 B&S enamelled wire. C6 and C7 are padded with fixed value capacitors.

A crystal microphone is used to drive the speech amplifier V5. V4 runs in class A. The modulation transformer is a standard 10,000 ohm tapped secondary loud speaker transformer.

In conjunction with a whip antenna, this rig has given many hours of good service, both as a home and and portable station. ■



V1 & V2 EF91
V3 & V4 6BW6
V5 12AX7

FIG 1 CIRCUIT DIAGRAM

THE GOLDEN YEARS OF AR IN VK

By OOTC No. 1823, Alan Shawsmith VK4SS
35 Whynot St., West End, 4101

Most of the OOTs who have been hams since what the Novice would call 'The Dream Time', i.e. fifty or more years ago, would say that their era, that of the Spark, was the Golden Age of Wireless. No one would argue this, or attempt to take from these pathfinders the romance and glory of their achievements. It must have been a fascinating period, indeed, when wireless and DX were being tried and proved for the first time.

However, there are OTs, rather than OOTs, who look back with nostalgia on the immediate pre-war years, i.e. 1930-39. They say that improved equipment, a big increase in the world-wide Ham population, good sunspot activity, fair-dinkum camaradie etc., all went to make AR a pleasant and interesting hobby; one which had none of the undesirable features of the modern 'rat-race'.

Again, some see the post-war II period as the all-time high. Sophisticated gear appeared, SSB, the rotary beam, the transceiver: a Contest Calendar and Awards Programme developed: IPS Charts came into being. The House of Hamdon extended its rooms, bringing with it new clubs and societies of diverse interests. Great migration occurred to the newly acquired bands of 15 and 10. Tremendous sunspot activity of 200 plus occurred in 1958/9, the like of which may not be seen again. All bands were wide open at S9 plus. Globe trotters Danny VP2VD, Gus W4BPD and Don W9WNV set up their gear at exotic spots and caused an all-time stir . . . . All this, plus a new official status — the tag of wireless experimenter, or hobbyist was replaced by "The Amateur Service".

Be all this as it may, it is not disputed that Australia has always been prominent in wireless experimentation. Even before WW1, telegraphists and others were endeavouring to send signals through space. However, it was not until the early 20s that licensed (the Government by this time had got into the scene) amateurs started to show themselves as a cohesive force, on the short wave bands. (They also played a tremendous part in the development of Broadcasting, which began about the same period — but that's another story).

These were the days of the now famous names of MacLurcan, Pike, Cullver, Howden, Hume, Elliot, McDowell, Coxon and others. To MacLurcan went the great honor of putting VK on the global DX map. In 1924, using only a few watts of power, he worked USA Ham Station 6EKY — a VK-W first. A few weeks later, he pulled another ace from the pack, by QSOing G-land on 20 metres. In the contact with 6EKY he is reported to have said "My hand trembled so much, I could hardly work the key".

From that time on, Hams, worldwide, showed how effective shortwave communication could be. MacLurcan continued on, working International DX whenever it appeared, until about 1928, when, like Alexander the Great who found himself with no more worlds to conquer, he pulled the big switch on DXing, as such. He had blazed the first trails and it follows that paths which lead to somewhere worthwhile soon attract many travellers. By 1930, SW-DX was commonplace.

It should be said here, that our Kiwi cobbers across the Tasman were right up with us as pathfinders. MacLurcan 2CM in Sydney, and Bell Z4AA in Waihimo, made the first VK/ZL QSO, early in 1923. In mid-1924, O'Meara 2AC Gisbourne, worked Brazzio of Argentina Sth. America approx. 10,000 km, to make the first ZL/SA International DX. Right on the heels of this, Bell Z4AA worked USA several times. In late 1924, he got through to UK to G2SZ on 90 Mx. Then Max Howden A3B in VK, QSOd G2OD a few weeks later.

For this writer, the Golden Age was that of the 1930s up to WWII. The hobby still had the "gone fishin" pace about it, which meant the quality of human relationship was better. Then, the esprit-de-corps prevailed: the bands were filled with personalities rather than with prefixes. As forty years have passed, one might naturally ask — "where are they Now?" Some, like old soldiers, have simply faded away: others, too many in fact, have made their last entry further up the log and moved to where all good Hams spiritually congregate — on a higher frequency. Many are still alive but only a few diehards are regularly on air.

Where now is Mr. DX (not Gus, W4BPD) of AC4YN in Lhasa, Tibet. Was his handle Stan? For many years, the only foreigner allowed into the Forbidden City: a trusted confidant of the Dalai Lama, until political unrest forced him to flee. In his era, Mr. DX was as famous and as sought after as Sir Gus was, at his peak. Working AC4YN was the pinnacle of achievement for the pre-war DXer.

Is the Voice of the Congo still making earthly noises? Stig, the affable priest signing ON4CSL, mostly on 10 Mx and dealing with a permanent pile-up. Another must, for the avid DX chaser.

PK6XX should be remembered by many in VK. An archaeological expedition in the Celebes; this station was on nightly, opening 807s and exchanging banter with all and sundry. Rag chewing, rather than QSOing.

Where is Scotty, XU8CR, in Shangai China? His regular signal at S9 plus, was impossible to miss. So was his brogue.

Pre-war, the American fone band was usually an unbroken wall of AM heterodynes, but a few calls, such as W6ITH, W6BKY and W6AM on the West coast, always managed to crash through loud and clear, no matter what the conditions. Of these, only W6AM is still fairly regularly QRV and he needs no comment, being a legend in his own lifetime.

And how many OTs recall these regulars of the 30s — EA4EO, I1ER, PY2CK, SP7DX, SP1AR, W1FH (the big sig), ZS2A (S9 on 7 MHz), ON4AU, G6LK, AC2RT, PK1DA, F8EX, ZL2GX (one time top of the DX world), KH6IJ and others too numerous to mention

In the words of Shakespeare — "all the world's a stage and we are the players". The OTs were the first to be able to perform to a global audience and against the scenario of their period — but now, like all good actors, they have, in the main, spoken their last lines, done their last turn and retired to the wings. Many, in their own way, made their own particular valuable contribution to AR. Now, the new Ham with changed values and outlook is replacing them.

In the days of breadboard and busbar when rigs were xtal controlled and rocks hard to come by, the "modus operandi" was to send a CQ on your fixed frequency, say 14080 and then tune from 14000 looking for a caller. Imagine this procedure in a present day contest. Imagine too, completely homebrewing the Rx and Tx, winding all coils, trannies, resistors, making fixed caps out of fag foil, variable caps from scrounged aluminium plates, pots etc.: grinding xtals and so on. Parts were so scarce, it was a case of tackle these jobs, or stay off the air.

What of the shape of things to come; the 2000 A.D. operator? (assuming Hamdon survives). Proposals have already been put forward that will virtually end the theory and code test. Instead, the intending operator will simply buy his plug-in appliance rig, demonstrate he can use it by calling CQ into what is no longer a global village but a teeming metropolis and have his ticket issued on the spot.

Those against this say it will turn Hams into CBers, and not even glorified ones at that, as the standard of operating and ethics will immediately begin to fall. Those in favour maintain it is the only realistic approach. They point out that already the "guts" of a modern transceiver is simply a fog in the head of 90% of the operators.

Whatever does come about, it seems that the operator of the future will bear little resemblance to the OTs of the past and the word 'Amateur' is likely to become an issue in semantics.

AR's balmy days — the Golden Years when we never had it so good will be determined at some future date by Historians looking back. Maybe the best is yet to come in the expanding world of VHF — no one knows. But what is known to all — or should be — is that AR's fate hangs like Nebuchadnezzar's scales — precariously

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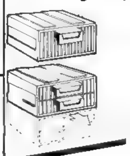

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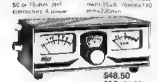

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No.	Diam (mm)	Wire Diam (mm)	Pitch per Turn	Price
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4010 8	40	1 0	1 6	$4.60
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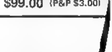

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These units are designed to be simply connected between the aerial and receiver of any 10 6 or 2 metre unit You can even mount them right at the aerial ... maximum performance Input impedance 50 75 ohm noise factor 5 8 db gain 20 30 db operating voltage 9 12v DC at 5 MA dimensions 70mm x 30mm x 15mm Fully wired & tested Circuit supplied only 4 connections required

ERB 27 (CB 27 29 mHz
ERB 6 50 54 mHz
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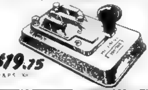
EXC 6 50 52 mHz
EXC 2 144 148 mHz
$27 50 ea p&p 75c

HI-MOUND HK705 MORSE KEY
Frankly the instructions are in Japanese but we can tell from diagrams that this key has real ball bearing pivots It is beautifully made and a delight to use heavy duty ... through Screws adjust spring tension Measures 160mm x 90mm x 65mm high ...



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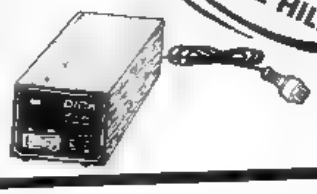

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(P&P freight on)

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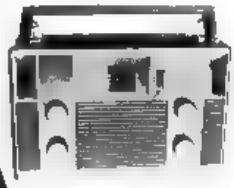

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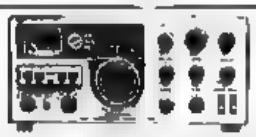

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YES! The NEW 'E' model

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FT 101E THE VERY LATEST OF THE 101 SERIES

FT 101ES SPECIAL FOR NOVICE OPERATORS

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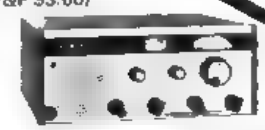

Each unit is $660.00
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2 Station INTERCOM

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In the balance. ITU 1979 will bring our moment of truth and our day of destiny. If the fates are kind, AR could go on to bigger and better things. If decisions go badly, then our service hobby could take a blow from which it might never recover. The only certainty is that every human activity faces abrupt and radical changes and AR can be no exception. It is wise to operate along the Confuscian maxim 'enjoy yourself, it's later —' and ponder on an observation by the late General D. MacArthur, who said 'there is no such thing as permanent security, only opportunity'. ■

EXTENDED USE FOR YOUR SWR BRIDGE

Geoff Wilson VK3AMK
7 Norman Ave., Frankston, Vic. 3199

One of the most useful items in any shack is the SWR bridge. This article shows how one unit can be used with many transmitters without uncoupling of co-axial cables.

Apart from its normal function the SWR bridge can also serve as a relative output indicator for transmitter tuning or carrier balance, etc. Where only one transmitter is used one SWR bridge is sufficient, but if more than one transmitter is used the need often arises to monitor outputs in several different lines. This can be done with one SWR bridge by changing it from line to line as required but at best this is inconvenient.

The other alternative is to purchase additional SWR bridges for each transmitter used but this becomes expensive and requires additional space in the operating area for each unit; much of the time the additional bridges remain unused.

Recently I wanted to monitor four different transmitter outputs but only one would be operational at any given time. These were (1) 160-10m from a HF transceiver (2) 6m from a transverter (3) 2m from a transverter (4) Provision for 70cm from a projected transverter. Having on hand a good reliable SWR bridge I decided to investigate ways of using this for all four applications.

The first thought was to switch the various lines but this had several drawbacks among which would have been the fact that only one could be used for receiving at any time. The usual SWR bridge consists of two main parts, a reflectometer unit in the antenna line and a suitably housed and scaled meter with calibration control and Forward-Reflected switching.

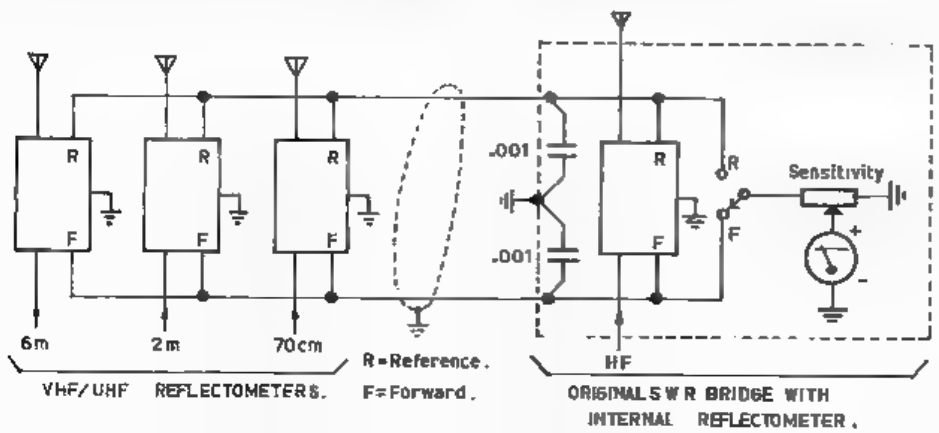
Although "S" meters are readily available from most sources it seems that calibrated SWR meters are all but unobtainable on their own, due no doubt to the fact that many makers of meters also produce SWR bridges. I therefore decided to use the existing meter and controls to cover all my needs. This had the extra advantage of not requiring any additional space near the equipment. The meter was a 200 uA type and sensitive enough to give full scale deflection with the commercial reflectometer on 80m so I left the co-ax from the H.F. transceiver connected to the SWR bridge.

Some time ago in "EA" printed circuit reflectometers suitable for VHF/UHF use were described (Electronics Australia, April, 1971). These were later made available through the WIA Disposals at a very reasonable price. I made up three of these units and placed one in each co-ax line from the VHF/UHF transverters and connected the outputs in parallel, i.e. each Fwd output connected to each other Fwd output and each Ref output connected to each other Ref output.

These outputs were then connected in parallel with that from the original reflectometer in the HF line. Now whenever a transmitter is operated the SWR bridge monitors each line and shows the SWR on the line in use, no switching or lead changing is required, the only variable being the setting of the sensitivity on the calibration control from band to band.

Another printed circuit reflectometer was also described in "QST" October, 1969, and this should also be suitable. Details of construction may be found by referring to the above articles which give adequate information to enable anyone to make their own.

The only modification made to the original SWR bridge was to add a polarized socket on the rear panel to connect the line from the external reflectometers to the internal circuit. There is no interaction between the units and it has performed quite satisfactorily for some time. The total cost involved has been only a fraction of what separate SWR bridges would have cost. ■



TECHNICAL CORRESPONDENCE

ST5 RTTY DEMODULATOR KIT

Since the article was written for AR (and published June '75), there has been a number of price rises and what with postage, the price of the Kit has had to be increased due to the above and the new prices are as follows below:—

Complete ST5 RTTY Demodulator Kit	$80.00
Or Split as follows:—	
Set of Semiconductors	$12.10
Printed Circuit Board and Instructions	$5.60
Mains Transformer to suit	$16.00
All Metal work including case, Chassis, Panel and Decal	$14.00

All prices include postage.

There will also shortly be available additional units for ST5 to add; AUTO-START/ANTI-SPACE FACILITY, also a 170 Hz, BANDPASS INPUT FILTER. ■

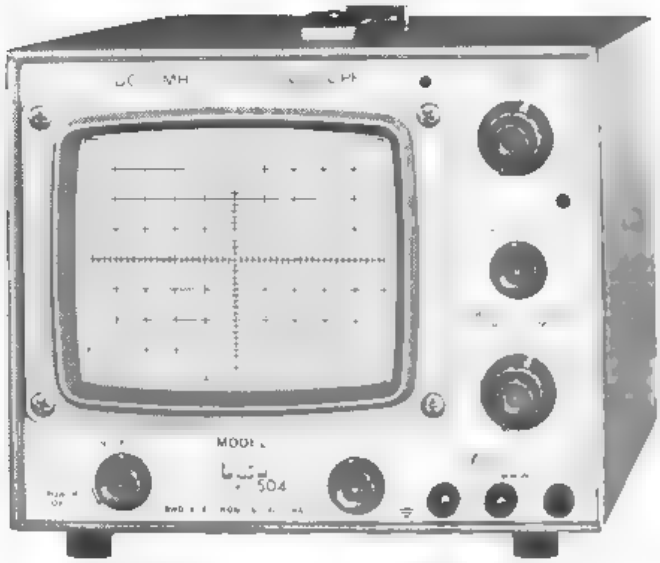
INDEX OF AR TECHNICAL ARTICLES

JANUARY 1971 – DECEMBER 1975

Have you searched for a Technical Article and could not recall the year it was published? Continuing with the 5-yearly lists published each December for the years 1955, 1960, 1965 and 1970, here is the 5-yearly list for 1975.

b.w.d

504 SINGLE BEAM CALIBRATED MEASURING OSCILLOSCOPE



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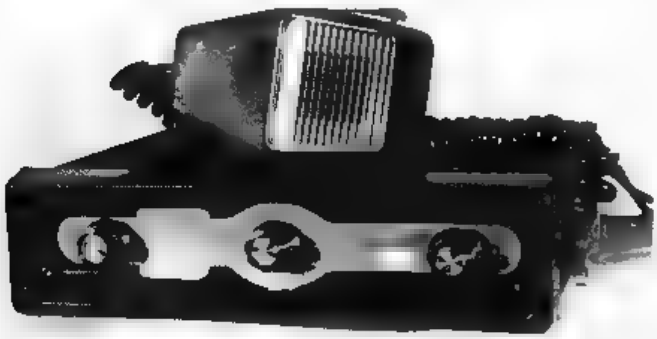
$255 WILLIS AUTOPHONE U 432-5 $255

6 CHANNEL, 70 cm FM TRANSCEIVER



The Willis Autophone U432-5 comes complete with microphone, chrome mounting kit, 1 set of high quality crystals and 90 day factory warranty. **$255.**

SPECIFICATIONS:

RF power output: 5 watts (min.)
Power requirement: 13.8V DC, 2A (max.) negative ground
Rx Sensitivity: 0.5 uV for 20 dB quieting

Weight: 3.2kg **Depth:** 20.2cm
Width: 19.6cm **Height:** 4.8cm

HIGH POWER VERSION, 30 watt (min.) RF output, 40 watts typical. **$295.**

OTHER WILLIS EQUIPMENT

2 METRE RF AMPLIFIER, 200 mW 25 watts (min.) output, **$45.**

TRIPLER/AMPLIFIER, 200 mW in at 2m, 10 watts out at 70 cm. **$55.**

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When ordering Autophone U432-5 please state frequency required.

NEWCOMERS NOTEBOOK

with

Rodney Champness VK3UG
and David Down VK5HP

LAYING OUT YOUR NOVICE TRANSMITTER (AND RECEIVER)—

Part 4

The layout of most pieces of equipment is important if they are to perform satisfactorily. This transmitter is no exception, although it is not as critical as some pieces of equipment in this regard. You are referred to *Newcomers Notebook* for March and April 1974 which deals with the layout of equipment in general. The main points that must be considered with any equipment are (a) that inputs are kept away from outputs, and (b) that incompatible sections are kept apart. These points have been observed in the layout of this transmitter.

The original chassis size used for the complete transceiver was 11 inches by 8 inches and this has proved to be a bit cramped due to some necessary alterations to the original design. It is suggested that the chassis size be increased to 12 inches by 9 inches so that crowding does not occur. The depth of the chassis should be 2 inches. The exact layout in fractions of inches for the various components has not been done as it is expected that you will have slightly different components to the author which will require slightly different mounting positions to the originals. The author used radio and TV components salvaged from old chassis. The PA tuning gang is one section of a dual gang receiver tuning capacitor, the relay was from an old PYE Reporter transceiver, the PA tank coil former was a plastic pill bottle, the chassis for the transceiver was made from 20 gauge galvanised sheet steel.

The layout of the transceiver can be seen in Fig 1 as viewed from above the chassis.

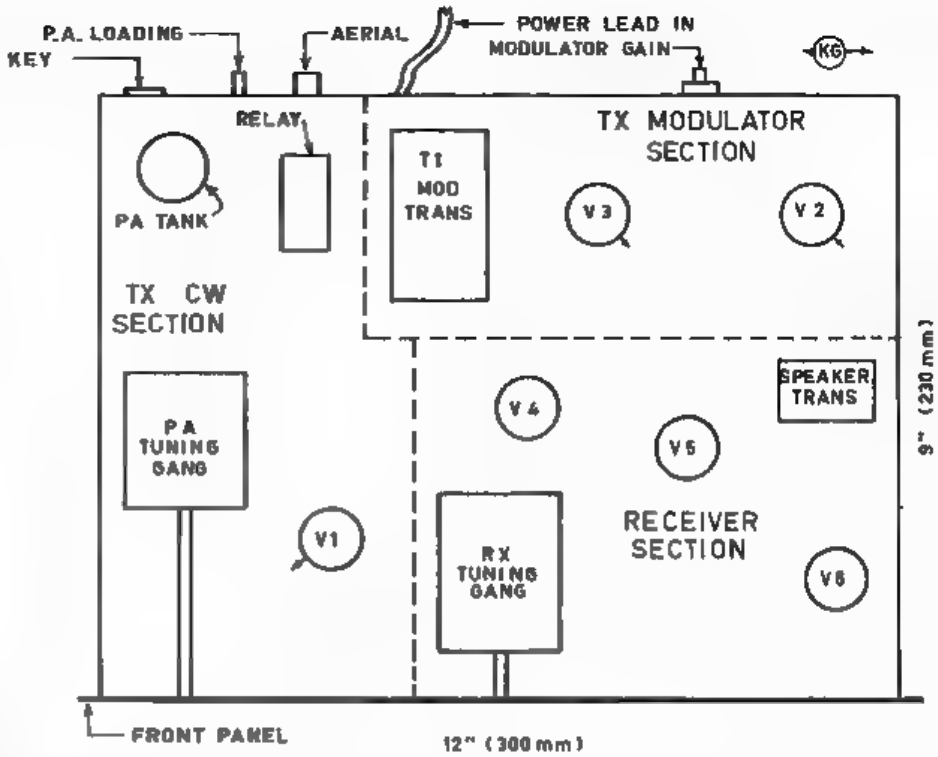

FIG. 1. CHASSIS LAYOUT

The dotted lines indicate the approximate extent of the below chassis wiring of each section of the transmitter. The small arrows pointing out of each of the transmitter valve location circles indicate the largest gap between pins on each of the valve sockets.

Fig 2 shows the front panel layout used with the transceiver. It will be noted that the front panel has a "margin" of ½ inch around it so that the complete unit can be mounted in an open fronted box using ½ inch timber such that this metal *margin* covers all of the wood of the box. On the bottom of the box rubber feet can be used such as available from Clark Rubber or two wooden runners can be glued to the bottom of the wooden case. It is desirable that a few holes of at least ¼ inch diameter be drilled through the bottom of the case for ventilation of the under chassis area of the equipment. A few holes can also be drilled through the chassis above heat producing components.

The back of the case should not be completely filled in; in fact the bottom 2½ inches should be open to allow ready access to controls and connectors on the rear apron of the chassis. The extra ½ inch allows inflow of cooling air and if a ½ inch gap is left at the top of the back as well, the hot air can be ventilated from the cabinet. This strip of wood on the back would measure about 12 inches by 2½ inches and could be 3 ply or masonite or other thin wood. In fact most of the cabinet (case) except the base can be made of quite thin timber if you have some wood working ability.

Some people may have a receiver and so will not be contemplating building the receiver section of this transceiver. The chassis can be correspondingly reduced in size or alternatively the transmitter power supply can be built on the section that was reserved for the receiver.

The power transformer should be located approximately where the receiver tuning gang is shown and orientated so that its laminations are at right angles to those in the modulation transformer, otherwise magnetic coupling between them could put hum on the transmitted signal.

During the next two months will be described a few minor alterations to the transmitter which will permit it to operate on 160 metres and operate with a separate receiver. A few minor component variations will also be mentioned.

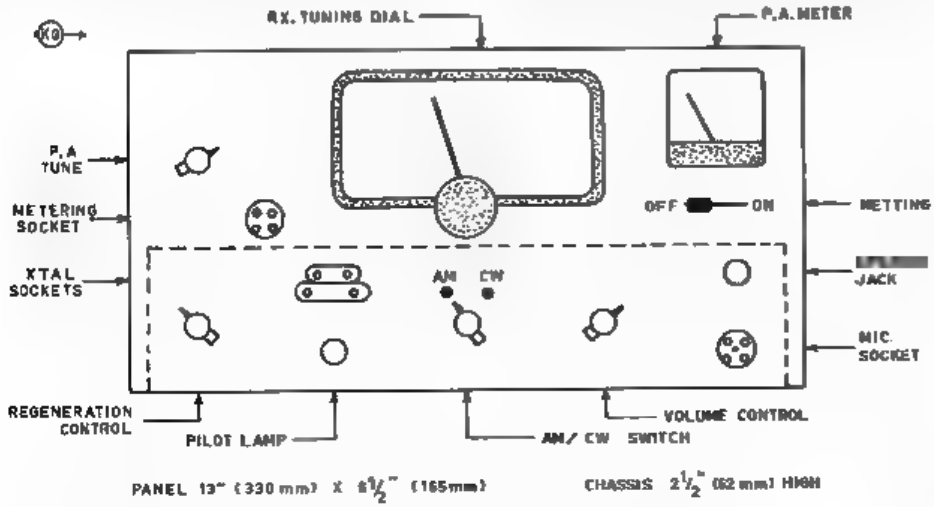

FIG. 2. FRONT PANEL LAYOUT

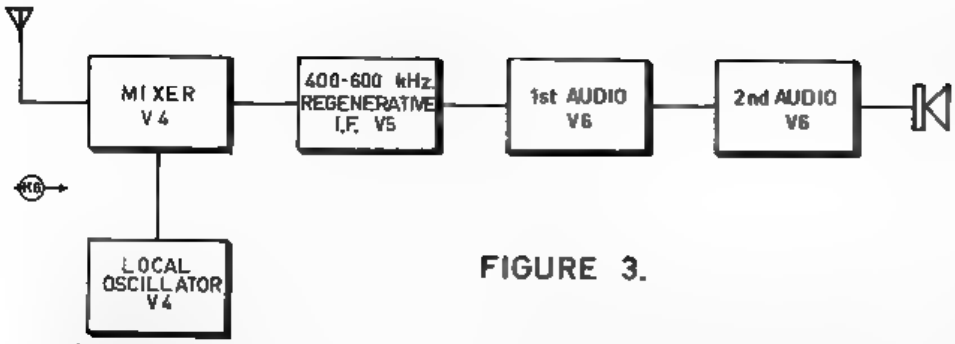

FIGURE 3.

NOVICE RECEIVER

It is not intended that the Novice Receiver will be described for a few months as a number of David Down's articles are waiting to be presented. However, just to satisfy your curiosity a very general description of the receiver follows. The receiver is a 3 valve superheterodyne using a regenerative IF stage. The mixer/oscillator can be 6BL8/6U8/12AH8/6AN7 etc., the IF is a 6BX6 or similar, the audio section can be 6BL8/6U8/12AT7/12AU7/6AB8 etc.

The receiver is not unduly complicated, although a number of problems were encountered when the author came to use some established designs described by well respected American and Australian magazines. The only relatively critical part of the receiver is the regenerative IF coil — the windings took some time to optimise for best performance. Fig 3 shows a block diagram of the receiver. ■

Commercial Kinks

with Ron Fisher VK3OM

3 Fairview Ave., Glen Waverley 3150

MORE ON THE FT101

In the October issue I touched on several aspects of the FT101 and this has brought a response from two readers.

The first was from Harry Leeming G3LLL. Harry of course is the driving force behind the famous G3LL RF Speech clipper designed to go with the FT101/B.

"I noted your report on the zener diode modification for the overload problem on the FT101. I have just run a quick trial on my own FT101, and it does work really well. At first it is deceptive as the signals which were previously S9 only read about S6 after the modification, and one is tempted to think that the sensitivity has been reduced. This is not the case however, as weak signals are just as strong and presumably the effect is caused (as is the cure) by the fact that introducing the zener doubles the AGC applied to the second gate of the first transistor. I think Jack Taylor should be congratulated on a very simple modification, which I have no doubt Yaesu will eventually get round to copying".

In the October issue I also published a hint on the 101 VOX. Roy Hartkopf VK3AOH had been having trouble with the VOX of his 101B and we had discussed the problems during a telephone conversation a few months earlier. Roy's letter makes interesting reading as he has come up with a new cause and solution to VOX problems.

"The key trouble is that it seems impossible to get information as to what is in the IC's especially the TA 7042M, and without this one is only guessing.

Anyway I finally decided to make a mock up socket and take the board out and have a thorough look at it. I eventually found that the key to the trouble is pin 7. This goes to the mode switch S2c and in the tune and CW positions it is isolated from earth. This is OK for the mic amp, but I cannot see why it should also disconnect the 470 ohm resistor from pin 6 of the IC as this is still used for the VOX. When it does this the threshold voltage on pin one rises by a couple of millivolts, enough to cause the sensitivity to change and the VOX to chatter. The answer is simplicity itself. Simply take the 470 ohm resistor off the pin 7 line and ground it permanently. The VOX problem entirely disappears. There is a handy earth run down the side of the board right beside the resistor and the change can be made in five minutes. I also suspect that this generally improves the VOX stability on all modes because the slightest noise on pin 6 (and it could be caused by the emitter current from the mic amp flowing through S2c), will change the VOX sensitivity. Why on earth Yaesu ever did this I cannot imagine. I think it must be the hangover from some previous design. Personally, I would be wary of grounding the source of Q5 as this could lower the efficiency without curing the basic cause. (Commercial Kinks October 1975).

I think changing C23 to .33 is a bit drastic. I changed it to .27 and found that plenty and I also changed C22 from .01 to .022 to match. I have not found any front end overload troubles but have not looked into this thoroughly.

A thing which annoys me is the fan running all the time on AC. Also the sidetone does not come on unless the heaters are on due to the fact that it is routed through S5b. So I removed the wires from S5b and permanently shorted them together and then ran a couple of wires beside the existing mains run back to the transformer. I connected the fan in series with this switch and now the fan goes on and off with the heaters and the sidetone is available without switching the heaters on.

I have also found the Yaesu XF3OB AM filter is physically and electrically compatible and I put this in the spare place where the CW filter normally goes. The improvement in the AM reception is unbelievable but some dicey rewiring of the mode switch is needed and I would not recommend it for the inexperienced".

I have visited Roy and heard the results of his modifications. They do indeed work well.

I was most impressed with the action of the AM filter and I think it would be very useful for those using the 101 on two metres with a transverter and of course for the 160 metre AM enthusiast.

This filter is available from Bail Electronic Services and is normally used in the Yaesu FR101 receiver. ■

PROJECT AUSTRALIS

With DAVID HULL VK3ZDH

[redacted]

One of the subjects raised with Amsat during my Washington visit in March was the inequality of the ARRL satellite 1000 award. This award is quite difficult for a VK or ZL to achieve as the 2 or 3 present holders in VK will verify.

Joe Kasser, Amsats publicity chief, was at that time looking for suggestions on a reasonable level of achievement for Amsats own Oscar award and the opportunity was taken to include suitable clauses for VK and ZL.

The new Award will be available therefore for confirmed contacts with 6 Australian Call areas and 2 countries. Colin Hurst VK5HI has "volunteered" to handle the applications for the award for VK on behalf of Project Australis and certificates should be available from him shortly on receipt of the following requirements:—

(1) All contacts must have been made via an Oscar spacecraft using any valid legal mode of transmission.

(2) QSL cards or written confirmation of contact must be supplied and must show that the contact was via an Oscar satellite.

(3) All contacts must be made from the same QTH (or within 25 miles of a particular location).

(4) Sufficient postage must be supplied for the return of QSL cards and the certificate.

(5) The award is free to WIA members and available to non-members on receipt of the nominal fee of 1 dollar ($A1) (payable to the WIA).

(6) Endorsements for one mode transmission and additional countries (in groups of five) are available.

(7) Applications should be forwarded to Project Australis/Amsat Award Manager, Colin Hurst, 8 Arndell Rd., Salisbury Park, South Australia, 5109.

Please note there may be an initial delay whilst supplies of the certificates are obtained from the U.S.

ORBIT BOOKS FOR 1976

If you are sick and tired of wearing out your calculator working out Oscar orbits please note that orbit books listing all Oscar 6 and 7 orbits for 1976 are available from Skip Reyman W6PAJ, P.O. Box 374, San Dimas, California, 91773 for $U S.3.00 (or 20 IRC's) post paid. If you want it in reasonable time I would recommend including additional IRCs and asking for Air Mail.

STANDARD ORBITS PREDICTION SHEETS

These standard orbits calibration sheets originally published in AR for Oct. '72, and reprinted last year, are still available. If yours is getting a little dogeared, or you've lost it and would like a replacement, send a medium sized stamped addressed envelope to Project Australis, C/o the call book address of David Hull VK3ZDH and we will be glad to send you another one (while stocks last).

We apologise for the lack of standard orbits data for January but the data was not to hand at this time. We hope to publish the data along with February as normal in January's AR. ■

20 Years Ago

with Ron Fisher VK3OM

Amateur Radio for December 1955 contained only one technical article, part three of Hans Ruckert's 'Transmitter With Low Harmonic Output'.

However it made up for the lack of technical articles with a superbly written story of the work going on at the Antarctic bases set up soon after the conclusion of the war. Naturally amateurs were well represented right from the beginning. Hans Albrecht VK3AHH told of the scientific aspect of the work in 'Science In Antarctica'

Remembrance Day Contest results were eagerly awaited and December AR announced that 'South Australia Wins Again'. The top scorers State by State were: VK5MS, VK6RU, VK2AHH, VK3ATN, VK7PM, VK4PQ and VK9DB. VK5MS and VK3ATN scored the highest points with 1001 each.

Back to the Antarctic. Fifty Megacycles and Above reports that the Macquarie Island boys were ready to go on six metres. VK1ZM had been heard in New Zealand and VK1IJ was ready with an automatic keyer for his transmitter. In 1955 of course VK1 was used for the Antarctic, the ACT VK1 prefix had not yet eventuated.

December 1955 Amateur Radio also contained a ten year index of technical articles back to 1945.

Christmas 1955 saw the start of the Pan Pacific Scout Jamboree at Clifford Park some 25 kilometres north east of Melbourne. The WIA Federal Station VK3WIA was set up on the site. They had transmitters operating on 80, 40 and 20 into enormous V beams. I well remember that Christmas 1955 was one of the wettest on record and the Jamboree site quickly turned into a quagmire. However many overseas contacts were achieved from the WIA tent on top of the hill. ■

LARA

LADIES AMATEUR RADIO ASSOCIATION NEWS

This past month, LARA activities have been moving along at a great rate. The 80m skeds are being held each Monday night, still at 8.00 p.m. Eastern time (or summer-time), and with the DX season coming up, perhaps more interstate contacts will start. LARA notes are now heard on VK5 broadcasts as well as VK3.

LARA representatives at the N.S.W South Western Zone Convention had the pleasure of doing an interview for Station 2QN, Deniliquin. This gave publicity to amateur radio in general and YLs interests in particular as organised YL activity is still fairly new on the bands. YL's also competed in the events held at the convention with moderate success.

The Jamboree of the Air was another event which LARA members joined in. Next time this comes around we hope to have more YL operators able to join in.

The LARA Victorian Division general meeting for October was held as an open meeting. With days like this and similar activities LARA hopes to develop a bigger group interested in YL activities. Guests were welcomed to the meeting and the famous "Great Foxhunt" film was shown.

Despite this earnest preparation by LARA enthusiastic hounds, the next LARA fox hunt, held 2 weeks later, was won by a newcomer to the field. (As fox on the next hunt, she won't be a beginner for very long). The day was a success as the organisers, with great intuition, picked the only sunny day in about 2 weeks of rain (flippers and snorkel are not usually regarded as necessary fox hunting requirements, but unfortunately some of the rain was still there).

November could be a fairly quiet month as far as LARA goes. Some members are pre-occupied with other fields of activity (such as examinations), so as a concession to this things such as the VK3 general meeting are being held later on in the month (this is on the 29th of November). December however should warm up a bit with Christmas activities and the Murray River Canoe Marathon in the New Year.

New members are able to contact LARA in VK3 via the Vic Division Rooms and Myrna VK5YN and Linda VK4YV are people to contact in their respective Divisions.

YL's are welcome on the sheds at any time. The 80m sked on Monday night at 8.00 p.m. is on 3650 kHz and there is a VHF sked for Melbourne YL's on Tuesday nights on 2m FM. ■

Intruder Watch

with Alf Chandler VK3LC

1536 High Street, Glen Iris, 3146

It is October 20th, 1975, and I have recently returned from a wonderful four months tour of the United States visiting many Amateurs that I have worked over the years, among them being my old Intruder Watch friend Bill K6KA at La Canada in Los Angeles.

I must take this opportunity of thanking and congratulating Ivor VK3XB for the excellent job he did in his handling of I.W. Co-ordination while I was away. I only wish I had more like he and Murray VK4KX and Les VK2AFG, without whom the I.W. could not function. It is a great pity that more members cannot see their way clear to do something to help in this worthwhile endeavour because intruders are not getting any less.

It may be appropriate at this time to quote a section from QST of September 1975: "It seems to us", and I quote — "Sometime in 1979 members of the International Telecommunication Union (ITU) will meet in Geneva, Switzerland, for a World Administrative Radio Conference (WARC). This will be the first conference since 1959 at which the entire table of allocations, from 10 MHz to whatever the upper limit may be by then, will be under scrutiny. There have been far reaching changes in communications technique and method since 1959, and as a result there may possibly be some benefits for the Amateur service but there will also certainly be some heavy pressures. Whether we gain or lose depends in part upon how well we prepare ahead of time". (My underlining).

The Intruder Watch is one way to prepare, by pointing out to the conference the intrusions that commercials have made into our exclusive Amateur bands, but we cannot do this unless you, the active members, participate and furnish us with proof of their intrusions. I ask you, how about it? ■

IARU NEWS

The June-July 1975 Calendar of the IARU contains brief details and words of praise for the Hong Kong and Warsaw Conferences of Regions 1 and 3 respectively. The comments end with the words, "Regions 1 and 3 emerge from their triennial conferences with sufficient agreement on WARC strategy to permit the Union to move forward with its planning. Similar success at the Region 2 Conference next year (scheduled for April 11th to 15th, 1976 in Miami) will demonstrate that the future of amateur radio is in good hands in all three of the ITU Radio Regions".

The Region 2 Conference will be hosted by the ARRL and will take place during the Bicentennial celebrations in the U.S.A.

It is recognised that the overall amateur radio effort should be co-ordinated closely so as to ensure that everything required is accomplished and to avoid costly duplications of effort. Consequently the President of the IARU (Noel B. Eaton VE3CJ) has the intention of calling together representatives of the three IARU regions in Miami for the two days immediately following the Region 2 Conference. Observers from member societies would be welcome but regrettably no expenses can be paid.

It had been originally thought that a meeting of all IARU member societies would have been desirable in preparation for WARC 1979 but this idea was abandoned in view of sharply escalating costs of world travel being beyond the financial capabilities of the amateur radio community and the fact that the accord emanating from the two regional conferences held this year has reduced the need for such a world-wide conference.

On their travels to and from the Region 3 Conference the Union's President visited amateur societies in Japan, Philippines (PARA), Thailand, Sri Lanka, India, Pakistan and Iran before attending the Region 1 conference in Warsaw. Dick Baldwin, W1RU, of the ARRL concurrently visited amateur societies in Malaysia, Singapore and Jakarta as well as the Region 3 conference.

The IARU has never had an emblem but during the year one has been designed. It is considered useful in maintaining the Union's identity as WARC is approached.

Some details are given about the amateur participation in the 1976 Olympic Games in Montreal during July. The special station with the call sign CZ20 will be designed to give visitors the best possible impression of amateur radio.

JARL are quoted as saying that as the number of Japanese amateur stations amounts to nearly 300,000 of the volume of QSL cards which their bureau handles is so enormous that they can no longer handle cards for non-members.

The August 1975 list of IARU member societies has reached a total of 69. Only 1.3 of the countries are in Region 3 apart from the USA, UK and French overseas representation. This means there are a number of countries in Region 3 not represented at all for one reason or another.

Since many of these countries possess a vote in the ITU which has a membership approaching 150, readers can rest assured that this situation has been noted in relation to WARC 1979 and appropriate action is going on behind the scenes wherever this is possible.

It will also be noted from WIA News in this issue that all appropriate steps are being taken by the Institute with the Australian Government's preparations for WARC 1979 as required by the Federal Council at the 1975 Federal Convention acting upon the outcome of the Region 3 conference in Hong Kong.

If forethought is any criterion nothing is being left to chance. ■

YRCS

with Bob Guthberlet

31 Bandon Terrace, Marino, S.A., 5049.

BLIND BOY IN BURWOOD, SYDNEY NEEDS HELP
15 year old Gerard Cooke would like someone to start a radio club in his area. He and several of his friends want to get their amateur licence but need your help. Contact him at 11 Calbor St., Burwood.

DO YOUR ACTIVITIES CONSIDER OUR BLIND FRIENDS?
In the formation of the DX group in Sydney this was one sector of the community the groups aims identified as requiring a special effort. The N.S.W. Blind Society and North Rocks School for blind children was contacted and now at each monthly meeting several blind high school students meet at the W.I.A. and engage in SWL activities and novice classes organised by the group. They meet on the first Friday of each month at 7.30 p.m.

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SPECIFICATIONS

SB-104 SPECIFICATIONS — TRANSCEIVER SECTION — GENERAL OPERATION: Frequency Coverage. 3.5 MHz through 29.7 MHz amateur bands, 15 MHz WWV receive only. **Frequency Stability:** Less than 100 Hz/hr drift after 30-min. warmup, less than 100 Hz drift for ±10% change in primary voltage. **Modes of Operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Readout Accuracy:** Within ±200 Hz ±1 count. **Audio Frequency Response:** 350 to 2450 Hz ±75 Hz (6 dB bandwidth). **Dial Backlash:** 50 Hz max. **Phone Patch Impedance:** 4 ohm output to speaker, high impedance output to transmitter. **Power Requirements:** 13.8 VDC nominal (max. 16 VDC) at Receive: 2 amp. Transmit: low power 3 amps., high power 20 amps. **TRANSMITTER: RF Power Output. High Power** (50 ohm non-reactive load): SSB 100 watts PEP ±1 dB. CW: 100 watts ±1 dB. **Low Power** SSB: 1 watt PEP (minimum). CW: 1 watt (minimum). **Output Impedance:** 50 ohms, less than 2:1 SWR. **Carrier Suppression and Unwanted Sideband Suppression:** 55 dB down from 100 watt single-tone output at 1000 Hz reference. **Harmonic Radiation:** 45 dB below 100 watt output. **Spurious Radiation:** −50 dB within ±3 MHz of carrier, −60 dB farther than ±3 MHz from carrier, except −40 dB at 3.39 MHz on 80 meter band. **Third Order Distortion:** 30 dB down from two-tone output, reference at 100 watts PEP. **Transmit/Receive Operation:** SSB: PTT or VOX, CW: Keyed tone VOX or manual. **CW Side-Tone:** Internally switched to speaker or headphones in CW mode. Approximately 700 Hz tone. **Microphone Input:** High impedance with a rating of −45 to −55 dB; approx. 25K ohms to match Heath desk-type microphone. **RECEIVER — Sensitivity:** Less than 1.0 microvolt for 10 dB signal-plus-noise-to-noise ratio for SSB operation. **Selectivity:** 2.1 kHz minimum at 6 dB down, 5 kHz maximum at 60 dB down. (2.1 nominal shape factor). **CW Selectivity:** (with accessory CW filter) 400 Hz at 6 dB down, 2 kHz max. at 60 dB down. **Overall Gain:** Less than 1 microvolt for 0.5 watt audio output. **Audio Output.** 2.5 watts into 4 ohms, 1.25 watts into 8 ohms, at less than 10% THD. Low impedance headphones (4-8 ohm). **AGC.** Less than 1 millisecond attack time, switch selectable 100 μsec and 1 msec release, and OFF. **Intermodulation Distortion:** −65 dB min., typically −57 dB with noise blanker. **Image Rejection:** 60 dB min. **IF Rejection:** 60 dB min. **Internally Generated Spurious.** Below 2 microvolt equivalent antenna input, except at 3.65, 3.74, 14.24 MHz and 21.2 MHz. **MECHANICAL — Front Panel Controls/Switches.** AGC - Off, Slow, Fast. AF Gain, Microphone Jack, Headphone Jack, Main Tuning, Mic/CW Level, Vox Gain, Vox Delay, Band Switch. **Pushbuttons:** ALC (Meter), 13.8V (Meter), Relative Power (Meter), 100 Hz (Double), Noise Blanker (On/Off), LSB (Mode), USB (Mode), CW (Mode), Tune, Hi/Lo (Power Select), VOX (On/Off), PWR (On/Off). **Rear Panel Controls/Sockets:** Anti-Trip, S-detone Level, Linear Amplifier ALC Input, Phone Patch Input, Phone Patch Output, Key (CW) Input, Speaker (4 ohm) Output, Spare (2), Receiver Audio Input, VFO Input, VFO Output, IF Output, Driver Output, Ground Post, Power Plug, Accessory Socket (includes relay output), Antenna Input, Receiver Antenna Input, Common/Separate Antenna Switch. **Dimensions:** 5¾" H x 14⅞" W x 13⅞" D (Less knobs, feet and connectors). **Weight:** 20 lbs.

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YRCS LUNCH TIME RADIO CLUB NET ON

Meets each Monday noon till 2 p.m. Summer conditions should bring in many interstate contacts and amateurs on the band are always welcome to join in. High school students on the net are Roger VK2BEQ at Mosman, Peter VK2BWR at St. Ives, and Barry VK2FP at Bexley. Also on the net are VK2YY Sydney Technical College, VK2BUV University of N.S.W and VK2BSU Sydney University.

THIRD PARTY MESSAGE AT LEAST ONE MONTH FOR P.M.G. APPROVAL

So the University of N.S.W Amateur Radio Society is hoping to combine community service with traffic handling training for its members as part of a request for communications for the Australian Tennis Federation.

AMATEUR RADIO DEMONSTRATION AT MONTH

RANDWICK HIGH SCHOOL, SYDNEY

Together with details on how to set up a YRCS Radio Club has resulted in boys and girls joining together to form a novice training club.

POLICE BOYS CLUB IN NORTH SYDNEY NEEDS HELP

They have many keen boys anxious to get on the air and need help in forming radio activities. Contact Sergeant Beacroft, Falcon St., Crows Nest, 2065.

DID YOU KNOW?

A booklet is available which outlines how you can set up a club, what YRCS is and how it can help you, as well as an outline of YRCS and Novice Licensing, and how to become an Instructor in the YRCS. Write to the Supervisor in your State. They are: VK1 (A.C.T. Division) Box 1173 Canberra City, 2601, VK2: R. C. Black, VK2YA, 10 David St., East Springwood 2777; VK3: F. H. Whittom, VK3BAN, 204 Churchill Ave., Braybrook, Victoria, 3019; VK4: P. C. Aldred, VK4CA, 15 Monmouth St., Morningside, 4170; VK5: G. Preston, VK5PI, 13 McGowan Rd., Para Hills, 5096; VK6: W.I.A. (W.A. Division), G.P.O. Box N1002, Perth, 6001, VK7: R. K. Emmett, VK7KK/T, 111 New World Ave., Trevallyn, Tasmania, 7250.

Contests

with Jim Payne, VK3AZT
Federal Contest Manager,
Box 67, East Melbourne, Vic., 3002

CONTEST CALENDAR

December

6/7	Tops 3.5 MHz CW
6/7	ARRL 160 metre
13/14	Spanish CW
13	Ross Hull commences
28	Hungarian

SPANISH CW CONTEST

2000 GMT Dec. 13 to 2000 GMT 14th. All bands 3.5 through 28 MHz. Usual RST and start 001. Contacts with EA stations score 2 points. Each EA call district is separate multiplier. Final score is total QSO points times the sum of multipliers from each band. The same station may be worked on each band for QSO and multiplier credit. Include summary sheet with your log. Entries to U.R.E. CONCURSO INTERNATIONAL, PO Box 220, MADRID 4, SPAIN by 14th Jan. 1976.

TOPS CW 3.5 MHz

1800 GMT 6th Dec. ends 1800 GMT 7th Dec.

Annual contest of Tops CW Club. Frequency between 3.5 and 3.6 MHz. DX on the low end. Exchange RST report only. Contacts with own country score 1 point, stations on same continent 2 points, other continents 5 points. Each call area in W/K, VE/VO, PY, UA and VK count as separate countries. Final score is total number of QSO points multiplied by number of prefixes worked. (Same as WPX) Single or multi operator entries to reach Peter Lumb, G3IRM, 14 Linton Gardens, Bury, Saint Edmonds, Suffolk, IP33 2DZ, England by 31st Jan. 1976.

ROSS HULL VHF UHF MEMORIAL CONTEST

1401 GMT 12th Dec. 1975 to 1400 GMT 18th Jan. 1976.

The rules for this contest remain unchanged from those published on page 32 of Amateur Radio for October 1974. Due to very limited participation last year and subsequent correspondence from some entrants a new set of rules is being developed. At this time the reprinting of the old rules and the complete metric distance chart (3 full pages in all) appears to be not justified. However a copy of the metric distance chart has been sent to the Secretary of each Division.

Entries should reach the Federal Contest Manager, Box 67, East Melbourne, 3002 by Wednesday, 18th February, 1976.

COMMONWEALTH DAY CONTEST 1975

A few late entries which arrived too late for inclusion in the results published last month.

Phone		
VK3AVJ	276	167
VK4NV	246	96
VK5ZIM	101	101
VK5LZ	31	31
VK5OG	12	12
CW		
VK2GT	240	43
RECEIVING		
J. Vaarnala (VK2)	1149	388

I hope that the certificates for the RD will be prepared and forwarded to reach you prior to the arrival of this edition of AR.

SHIRLEY GRAMMOND TROPHY

This trophy has been donated, primarily, to acknowledge the important part played by high scoring entrants in Amateur Radio Contests, and also to provide added incentive to entrants.

Rule 1
The Radio Amateur, who is a member of the Wireless Institute of Australia, and holds a VK prefix, and who, under the scoring arrangement of Rule 2 obtains the highest aggregate of points in the contests nominated by the Federal Contest Manager, shall be declared Contest Champion for a nominated period of 12 months.

Rule 2
The Amateur obtaining the highest score in a nominated contest shall receive 10 points towards the trophy, the next highest scorer 9 points, and so on with the person in tenth place receiving one point.

Rule 3
The Contest Champion for the nominated period shall hold the Contest Trophy for 12 months.

Rule 4
The Federal Contest Manager shall each year, at the time of announcement of the name of the new Contest Champion, nominate the succeeding period and contests applicable to the trophy, and, together with such of these rules as he considers necessary, publish this information in Amateur Radio.

Rule 5
The Federal Contest Manager shall once in each year publish in Amateur Radio the names of all Contest Champion trophy winners with the related year/years of the contest. ■

MAGAZINE INDEX

with Syd Clark, VK3ASC

CQ MAGAZINE July 1975
The Microprocessor in the Hamshack; The True Essence of Homebrewing; Modification of the Heath HW-202; The Function Generator; The Multi-Band Dipole; Measurement of Capacitance Using A VTVM; An Electronic Hidden Word Puzzle; Accuracy & Calibration of SWR Meters, Cheap Selectivity for the Hammarlund HQ-215 and other 455 KHz IF Receivers; QRP Transmitter; Measuring the Transmitting Frequency of the Heath HW-16.

HAM RADIO June 1975
A Phasing Type SSB Transmitter; Slim-Line Touch-Tone Conversion; Hi-Fi Interference — Causes and Cures; 500 MHz Pre-scaler; Stable Crystal Oscillators; Speech Processor for the Heath SB-102; Noise Figure Measurements; Collins S-Line Drift Reduction; Cosmos Integrated Circuits.

QST August and September 1975
The Accu-Memory; A Simple Field Strength Meter and How to Calibrate It; Pip Squeak Modifications; Radio Direction Finding Techniques; Improved Wide Band IF Responses from the Double-Balanced Mixer; The DXer's Crystal Ball, Part 2.

Harmonic TVI — A New Look at an Old Problem; An Alternative Method for Phasing Crossed Yagis; The DXer's Crystal Ball, Part 3; Coherent CW —

Amateur Radio's New State-of-the-Art; The Micro — To MK2 Keyer; Construction Hints for VHF Converters; A High Performance 50 MHz Amplifier Part 1

RADIO COMMUNICATION August 1975
A Small Transistorised Power Amplifier for 2M; An Aerial Splitter Unit; A Compact Medium Powered Linear Amplifier; A Crystal Controlled Solid-State Source for 10 GHz.

SHORT WAVE MAGAZINE August 1975
Going QRP On Eighty, DX from Eday Is. Orkney; Noise Bridge for Antenna Measurements; Ten Metre Aerial Amplifier; Cheap RF Output Meter. ■

MORE FROM THE CW NET

A meeting of CW Net regulars was held in Sydney on September 27th. Those present were VK4II, VK2AV, VK2AFG, VK2BWC, VK2RY, VK2SM and VK2YK.

The meeting made the following proposals: Firstly, matters concerning operation of the CW Net.

(a) Conversation with the NCS should be minimal — such items as newsy bits and technical details would be better sent later.

(b) We should limit contacts to about 20 minutes to permit members to get in at least four QSOs.

(c) When a station (say VK5XYZ) is readable to another (say VK2ABC) but not to the NCS, we suggest this procedure be tried:—

VK2ABC makes "VK2NCS de VK4ABC QSO VK5XYZ AR".

VK2NCS makes "VK4ABC and VK5XYZ QSY to 70xx K"

VK2ABC makes "VK2NCS de VK4ABC R VK5XYZ QSX 70xx QSY AR".

The contact can then proceed normally with the NCS having it entered in his log and VK5XYZ calling VK4ABC on 70xx kHz.

The next suggestion should interest most amateurs and there will be many who know it proposes really nothing new. Although this is only a suggestion some of us have been trying it out long before this note appears in print. In effect we are suggesting that we put a window in the 7 MHz band using 7025 kHz for calling only. The benefit to low power stations and to others who may find it difficult to break in on established QSOs and for emergency calls etc. is obvious. It does not of course mean that we should not answer calls made on other frequencies.

We intend to try it during non-DX hours and we hope it will receive a fair trial. Calls on 7025 should be brief and use normal operating procedures. Check that your listening spot is clear.

Example

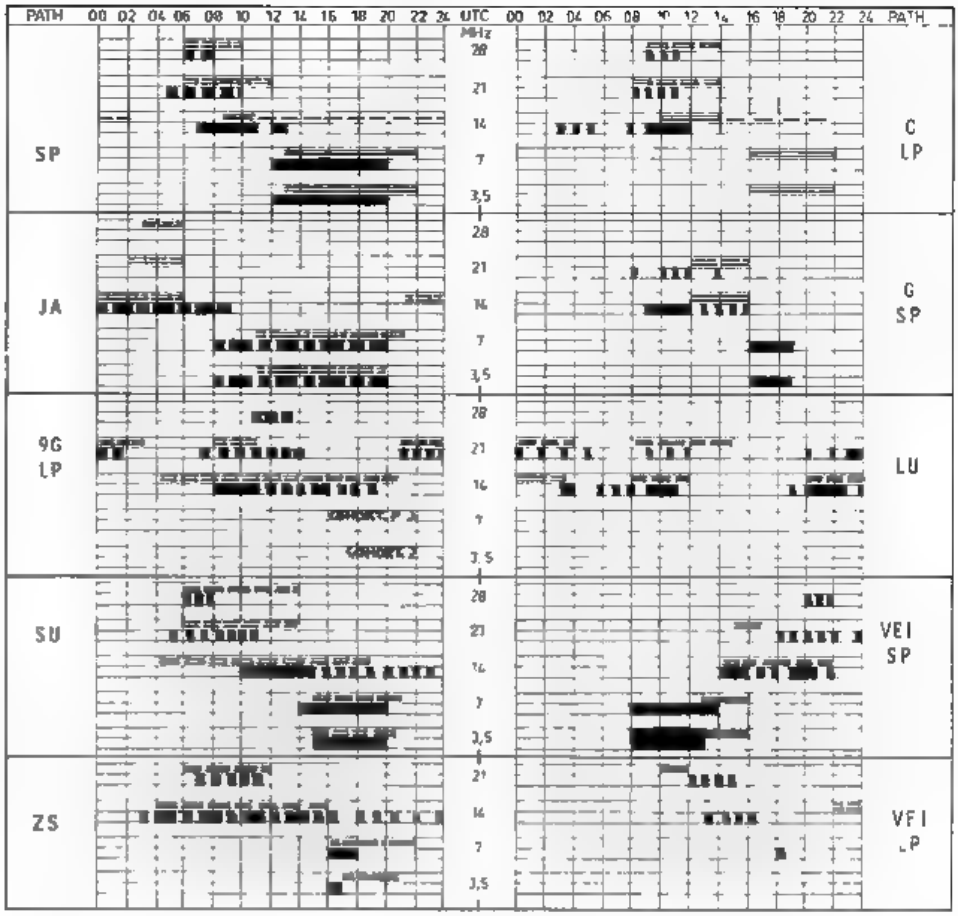
"CQ CQ de VK2XYZ, Cq Cq de VK2XYZ etc. QSX 70xx QSY AR" VK2XYZ listens on 70xx kHz. Other stations call him there. 7025 is thus left open for others to use in the same way.

This should not put crystal-control stations at a disadvantage. All they need is one crystal off or close to 7025, and another not so close, for listening.

VK-2AV
for CW Net. ■

IONOSPHERIC PREDICTIONS

WITH LEN POYNTER VK3ZGP



A new way of predicting solar activity discovered by G M. Brown of University College of Wales, Aberystwyth, is reported in Wireless World, September, 1975.

It stems from his observation that there is a strong correlation between the sun's effect on the earth's magnetic field and the number of sunspots SIX YEARS LATER. The reason for this is not known, but it holds good over a time span which goes back to 1885 and the correlation appears to be very close.

If it proves to be a genuine effect and not a freak of statistics then it could give radio propagation experts a valuable method of improving their short wave propagation predictions.

The magnetic effect in question operates on the horizontal components of the earth's field. This normally goes through a minimum about 11.00 hours local time, but on "Abnormal Quiet Days" (AQDs) the minimum is some other time. It is the AQDs which predict the sunspot numbers. Since the AQDs are most frequent at the sunspot minima, it could be that they mark the beginning of the new cycle of solar activity rather than the end of the old one. "If this relationship proves valid it implies that the sun 'breathes" with an 11 year period, such that the size of the solar activity maximum is determined at the very beginning of the cycle, or perhaps the very end of the preceding cycle, from the 'depth' of the solar minimum"

Well, we have another possible prediction service. I did check with our local observatory and this magnetic effect is part of the K measurement mentioned so much of late. From my recordings, and my interpretation of AQDs, there certainly is a general quietening down of activity. The number of disturbed days have dropped considerably which I understand is fairly normal for the time of the year However, it will be interesting to follow up on these theories and compare it along with the multitude of others. Someone will be right.

On the subject of predictions, an index which has caught my attention is the 0F2 or Solar Flux F2 Index This has largely been the work of Dr. M. Joachim CCIR and is featured in the Telecommunication Journal of the International Telecommunication Union. Back in 1967 the Dr. published papers discussing the three basic indices of ionospheric propagation R12 (12 monthly smoothed sunspot number) IF2 (based on the Vertical — incidence critical frequency of the F2 layer at noon from 9 stations, now 13 stations) and 0 or Solar Flux expressed in Janeky Units (1 Jansky = 10-22 W/m-2/Hz-1), measured at 2400 MHz the effect of ionospheric "hysteresis" to be seen in the behaviour of IF2, and a new method of prediction d on the ITU computer. The results obtained suggest that it should now be possible to work out a new propagation index more closely related with ionospheric data and more accurately predictable than the indices in use at the present time

In more recent times more contributions have been added and in March 1975 published under "Long Term periodicity in ionospheric activity" was the following summary. Recent work, including Cohen and Lintz CQ March 1974, indicate that in addition to the well known cycle of 11 years, the sun-spot and ionospheric activities have a long term periodicity, as do other activities connected with the movement of the planets around the sun. Some have applied mathematic analysis to periods up to 178 years using the values of Solar index R12 as observation data, these values have been recorded since 1749.

To enable similar analysis methods to be applied for predicting the ionospheric index 0F2, which is claimed to be more closely related with ionospheric data, the CCIR (International Radio Consultive Committee) Secretariat has extrapolated the series of 0F2 values for the period 1749 to 1946. The correlation employed the values of 0F2 and R12. During this analysis it showed the existence of cycles of about 11 years and 89 years.

A further comparison between the computer generated indices and measured values of 0F2 for the period 1947 to 1974 yielded a standard deviation of 8.6%.

For some years the ITU Journal has published basic indices for ionospheric propagation, which attracted my attention during 1974. In that year I was closely associated with VK3WU in an attempt to produce a DXCC on 20m within 12 months. Being new chums we probably learnt the hard way. All the gloom about poor conditions did not deter us and mid March 1974 saw the project launched. It is now history that we succeeded and the tally now stands at 235 countries worked. Confirmations stand at around 161

Our attention was directed to talk of Solar Flux and A index but it was early 1975 before it started to dawn on us what it was all about. Not having any real evidence as to why conditions were reported to be poor, when we found it obviously to our advantage. The 0F2 index gained my attention.

For comparison purposes the index for 1974/75 measured and 75/76 predicted are displayed below.

Month	1	2	3	4	5	6	7	8	9	10	11	12
[illegible]	82	82	82	82	86	84	86	85	84	86	88	85
1975	81	75	70	74	74	76	77	77	77	77	78	79
1976	79	77	76	78	77	79	80					

Those in bold type are predictions as at July, 1975. My main interest was that so long as the monthly mean remained above 80 conditions were in the main from good to excellent. We were able to trace the bad periods to incidences of high geomagnetic disturbances i.e. high K figures leading to high A figures — in keeping with Jacobs Linz and Cohen CQ articles on propagation.

Once it dropped below 80 then the change came. Early 75 saw considerable deterioration in general conditions, however in this latter part of 75 somewhat of an increase no doubt due to seasonal conditions. The interesting part is that the predictions show a rising index mid 1976 around the time many predict that the minima will be over and the new cycle expected to start.

As a direct comparison between R12 IF2 and 0F2 here are the figures for 1974.

Month	1	2	3	4	5	6	7	8	9	10	11	12
R12	33	34	34	34	35	35	34	33	32	30	28	25
IF2	7	17	13	19	21	22	29	20	20	22	22	2
0FT	82	82	82	82	86	84	86	85	84	86	86	85

I propose during the coming year to mention not only the sunspot data available, but also the measured and predicted index for 0F2 for those who like to look at indices. I hope to have further information of G. M. Brown's method of prediction to add further fuel to the fire.

ADDENDA

Sunspot data for Sept., 1975.

Provisional mean = 14.1 (Aug. 39.3, Jul. 26.3 June 11.4). Smoothed mean R6 March 75 = 21. (Feb. 22.2, Jan 23).

Predictions of smoothed monthly numbers — Oct. 11, Nov. 10, Dec. 9, Jan. 6, Feb. 7, Mar. 6.

Unfortunately there will be no predictions in the January issue. However, should anyone require any specific data I would be only too pleased to help you. A SAE will help. Best of DX for 1976, trusting you all have the best during the coming festive season

PREDICTIONS COURTESY: IPS SYDNEY
0F2 DATA: TELECOMMUNICATION JOURNAL
LEGEND FOR PREDICTION CHART
ALL TIMES UNIVERSAL.
TOP PORTION OF BAND CHART FROM PERTH
BOTTOM PORTION OF BAND CHART FROM EASTERN AUSTRALIA
FULL LINES. BETTER THAN 50% OF THE MONTH BUT NOT EVERY DAY.
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AMATEUR BAND BEACONS

VK0	VK0MA, Mawson	53.100
	VK0GR, Casey	53.200
VK1	VK1RTA, Canberra	144.475
VK3	VK3RTG, Vermont	144.700
VK4	VK4RTL, Townsville	52.600
	VK4RTT, Mt. Mowbullan	144.400
VK5	VK5VF, Mt. Lofty	53.000
	VK5VF, Mt. Lofty	144.800
VK6	VK6RTV, Perth	52.300
	VK6RTU, Kalgoorlie	52.350
	VK6RTW, Albany	52.950
	VK6RTW, Albany	144.500
	VK6RTV, Perth	145.000
VK7	VK7RTX, Devonport	144.900
3D	3D3AA, Suva, Fiji	52.600
ZL1	ZL1VHF, Auckland	145.100
ZL2	ZL2VHP, Mt. Stewart	52.500
	ZL2VHF, Wellington	145.200
	ZL2VHP, Palmerston North	145.250
	ZL2VHP, Palmerston North	431.500
ZL3	ZL3VHF, Christchurch	145.300
ZL4	ZL4VHF, Dunedin	145.400
VE	VE1ATN, Canada	50.060
KG6	KG6JDX, Guam	50.105
	KG6APP, Guam	50.150
	K2IRT/KG6, Guam	50.090
JA	JD1YAA, Japan	50.110

As December is likely to be the peak month for Es type of operating, an increased beacon list is submitted this month. Whilst conditions at the moment are not ideal for long distance DX, one never knows what is available unless listening is done. Hence, why not look around the lower end of the 50 MHz band as often as you can, particularly in the mornings to mid-day, and perhaps late afternoon. Of course the next problem you have is that if you hear a station, say in Guam, how do you let him know you are receiving him — we are operating 2 MHz further up the band! You could phone him, or get on 20 metres and hope you can contact someone else there to pass the message along. Of course in the meantime he will probably fade out! Or you send a telex! I also know another way! So there are various ways around the problem, the old hand at the game will organise something.

For the newcomer, plenty of patience will be needed, and this can apply even to New Zealand stations. As these invariably come in on second hop transmissions, they generally are not as strong as the VK stations on single hop (about 1600 Km). It is no use nowadays looking down on 51 MHz for ZLs. Those wishing to work you will be found on the lower end of 52 MHz mixed in with all the strong VKs. Other than for exceptional conditions you will need a really good antenna and quite a bit of power output to make it across the Tasman Sea, from VK5 anyway.

The VK6s will need everything they can muster. A good receiving converter is a prime requirement, and be on good terms with electricity authorities to ensure you have no leaky insulators on the power lines nearby. Talking about power lines, have any of you considered what your line voltage might be at any one time, particularly if you live in an industrial area, or the country where there may be many electric motors driving substantial water pumps for irrigation purposes. At my QTH, which is a rural area with much irrigation, I have noted voltages hovering around 225 volts at times, and for long periods about 230 volts. This plays havoc with the output of your transceivers and linears. You can be losing up to 25% of your output due to reduced HT and heater voltages. I monitor the mains voltage all the time, and use a Variac to counteract this drop. Input and output AC meters are necessary for best results, although you could get away with one by monitoring the voltage you feed out of the Variac to your equipment.

In addition to the substantial beacon list above, the newcomer should realise that you can use the sound transmissions of the three main Channel O television transmitters in Australia. They are off-set 10 KHz from each other and can be found as follows. Wagga 51 740; Brisbane 51.750; and Melbourne 51 760 MHz. As they radiate 100 kW ERP they need to be heard quite strongly before you are likely to work many amateurs from the same area. This particularly applies to the New Zealand TV stations, which are to be found around 50.750 MHz.

Don't lose sight of likely openings on 144 MHz when strong conditions prevail on 52 MHz. Use the various FM repeater channels in other States as a guide, also Channel B on 145.000 MHz. The most likely times for 2 metre contacts will be on Saturdays and Sundays when more operators are available, and from about mid-morning to mid-day. This could apply to almost any weekend during December, and possibly early January, with the most likely a week or so before Christmas.

So go to it chaps. The more you operate the more likely you are to work something different and/or unusual. But don't sit silently in the shack all the time just listening. If everyone did that nobody would be worked. Whilst it is a good thing to do plenty of listening, it also pays to stop listening every now and again and start calling. Remember the recognised calling frequencies are 52.050 and 144.100. Once you have established contact however, get off those frequencies and work a few kHz higher or lower and leave the calling frequency for others, possibly in a totally different area from that in which you are working. See you on 6!

EME OPERATIONS

Lyle VK2ALU, of the Depto EME project, sends his usual notes via "The Propogator". On 7/9/75 M grade reports were exchanged with PA0SSB. PSFT was then worked with good signals each way. He later tried SSB which could be heard in the noise but could not be resolved clearly.

Repairs and adjustments are continually being made to the 432 MHz equipment at Depto to improve prospects for contacts, but the group are sorely in need of further helpers to keep everything going. Same old story it seems. However, the transmitter frequency checking system, using HF signals from standard frequency stations, has been installed.

Chris VK5MC at Hatherleigh near Millicent sends a brief report of his 144 MHz EME operations. 1/9/75 1814Z, JA5DR, report sent 539, received 539. This was a new country for Chris. 25/9 1326Z, W7CNK, sent 549, received 339; W6PO, sent 549, received 439. 29/9, 1656Z, K2RTH, "O" and Roger sent and received. Chris now has a post-amp and a pre-amp up in the box at the stacked rhombics antenna, and this does appear to be giving a better overall system noise figure. Thanks Chris for your information.

GENERAL

I note from "Blurb" of the South East Radio Group in Mt. Gambier that the Club projects for the 1975/76 season are going to keep members busy. Such things as: Establishment of a 2 metre beacon, AND a 2 metre repeater; re-drafting of the Constitution, fund raising, new Club Rooms and participation in the Back to Mt. Gambier celebrations. That's quite a task. We wish them well as the Mt. Gambier boys represent the most active group of really out-of-town VHF amateurs within reach of both Adelaide and Melbourne. I also note much work has been going on upgrading and rebuilding 2 metre converters, so this augurs well for the summer period of operating. It is great that these boys think in terms of VHF when so many of them have full callsigns.

The Gold Coast Radio Club Newsletter has arrived again, and I note they have now received their UHF repeater from John Willis, VK4WN. It operates narrow band FM, receives on 433.100 and transmits on 434.300 MHz. It is presently not proposed to instal it on Mt. Tamborine, the site of the present Channel 1 repeater, until the completion of the new VHF antennae.

Winston VK7EM writes to advise he will be active again during the summer months on ATV. He is still running 30 watts input to a QQE03/20, and a phased array 6 metres high. Transmit frequency is 426 MHz. Winston hopes for many more contacts to VK3 this year, and other areas too if possible.

In north-western VK7 there are many stations preparing for ATV so it could be an interesting year for the cameras. Skeds can be arranged with Winston via Channel 4 repeater, Channel B, 144 MHz AM or on HF. He monitors the commercial TV stations across the water and when signals are reasonable listens on all 2 metre channels including the VK3 ATV group channel V.

Representing the Mackay Amateur Radio Club, a letter has arrived from Publicity Officer Eddie VK4RR, probably better known to some as VK4ZRE. He reports 2 metre activity is on the increase in North Qld., with many large antennae being constructed. John VK4TL in Cairns started the ball rolling with four 5 elements yagis, vertical on Channel 50, and ran regular skeds with Ron VK4ZLC in Townsville, and found contact could be made almost every night. Richie's QTH is 33 Km north of Mackay and about 600 Km from Cairns, and he finally worked John in Cairns on 14/7/75 after hearing him for several months, using two 12 el yagis at 17m high, with 4 watts output from the transmitter. (Not a bad effort 5LP). Now that he is running 60 watt it has meant quite a few 5 x 9 contacts to Cairns.

Richie has found in the north the same things that happen down here. When the activity increases, you suddenly find the band is open on many more occasions than thought possible. He reported an outstanding opening on 12/10 and worked John VK4TL and Ted VK4YG in Cairns, Mario VK4ZMS in Ingham, Joe VK4JH in Townsville, and Ross VK4RO in Ayr.

Longest distance contact was between Ron VK4EN in Mackay to John VK4TL in Cairns and best contact was between Peter VK4APS operating mobile in Mackay with 2 watts to a 5/8 whip to John VK4TL in Cairns. On the same night in Mackay Ron VK4EN and Peter VK4APS worked Claude VK4UX and Charlie VK4MP in Rockhampton on Channel 40.

Richie further reports there is quite a deal of interest in 2 metre SSB in the north, but the problems of lack of finance to buy commercial equipment, and the lack of time to build it yourself, seems to be delaying the commencement to any extent. One can get on FM for as little as $30 for used equipment, but many times that for SSB equipment.

Thanks for writing Richie. The above information has been included in these notes to let the rest of VK land know that 2 metres in one form or another has not been overlooked in the north, and when the conditions are right as Christmas approaches, contacts to the south could be the order of the day, and with some of the very substantial antennae erected in the north such contacts are certainly feasible.

My old faithful, Kerry VK5SU from Ceduna, has written to make sure we all know he will be around again this year, on 52 MHz to all States, on 144 MHz to the east, monitoring 144.050 and 144.100, repeaters and simplex channels with calls on these frequencies especially during 6 metre openings.

Kerry is also taking up the cudgels for 2 metres to the West, particularly to the Perth area. He has received advice that Phil VK6ZKO and Peter VK6ZDY are both keen to work long haul 2 metre DX. They both hope to be running high power to 19 element 24 foot yagis. Phil's QTH is right on top of the ranges (330m high) east of Perth with a clear take off to the east! (That's certainly news for us over here — the chances of working Perth in the usual way have been rather slim, but there are hopes for the future — 5LP)

Kerry also mentions the Perth beacons have been re-located and are now at the 40m level of the TVW6 TV tower at Bickley, this being 350m above sea level. Antennae have been rebuilt, with a halo on 145.000. The halo for 52.300 has given some trouble and may have to be rebuilt again. At the moment the 6 metre beacon is using a dipole pointing north and south! There are problems in pointing it east and west.

The band on 6 metres opened for Kerry on 12/10 to VK3, with stations in Melbourne, Geelong and Werribee being worked. What a lovely distance you are from everybody Kerry. But how lucky are we to have such a keen VHF-er at a place like Ceduna, keeping everyone around the Continent on their toes through your generous contacts. Thanks for writing, sorry I missed you when you were in Adelaide recently.

As of this writing there have been a few short 6 metre openings to VK5. Reasonably good one to

VK6 on 1/11/75. We should all soon be having more of these openings, with the pattern last year being for some very strong one's early in November. By the time these notes are read the Ross Hull Contest should be in full swing, so wish you all well in that.

Christmas is coming, so I take this opportunity of once again sending greetings to all my correspondents who keep me supplied with notes, to all my readers who from time to time write and say "thank you" and to those of you who recognise me on the air and also say "thank you". If I can give some pleasure or create an interest for a number of you then I am rewarded; if many of you feel these writings are generally worthwhile, then I am amply repaid.

So, a Happy Christmas to everyone, and a very prosperous New Year, and plenty of DX.

Thought for the month: "It's a strange life. You can skate on thin ice and end up in hot water."

The Voice in the Hills. ■

Awards Column

with BRIAN AUSTIN VK5CA
P O Box 7A, Crafers, SA 5152

Conditions for the Hong Kong Firecracker Award have been amended as follows:

1. All licensed radio amateurs and SWLs throughout the world are eligible to apply for the award.
2. Claims may be made within the following categories:
   CW only,
   CW/Phone or
   Phone only,
   and the award will be endorsed accordingly.
3. The contacts are required to be made with **different** VS6 stations as follows:
   (a) Zones 18, 19, 24, 25, 26, 27 and 28: 10 contacts
   (b) all other Zones 6 contacts
4. Contacts may be made on any of the authorised amateur bands.
5. Contacts made on or after 1st January 1964 ONLY will be eligible for the award.
6. Contacts made during contests will be eligible for the award.
7. In support of an application for the award, QSL cards must be held for the contacts claimed. It is not necessary to send QSL cards with the application, alternatively a log extract, certified by the National Club or Society will suffice. Details required are: date, time, band, mode, and signal reports, both given and received. Minimum report accepted will be readability 3 and for CW tone 8 on the RST system.
8. To cover administration costs, 10 IRCs are to be sent with the application. Postal orders, stamps or cash not acceptable.
9. Applications for the Hong Kong Firecracker Award are to be sent to the QSL Manager, Hong Kong Amateur Radio Transmitting Society, P.O. Box 541, Hong Kong.

WAOY

1. The award is available to licensed amateurs.
2. Contacts on and after 11th April 1965 are valid.
3. Do not send QSL cards. A list, giving full details of the contacts should be certified by another licensed amateur.
4. Mixed mode contacts — CW to SSB etc. — and cross band contacts are not valid.
5. The fee for the award is 10 IRCs or equivalent.
6. The address for application is:
   FRA,
   Awards Manager,
   Post Box 184
   Torshavn
   Faeroe Islands.

Rules: For stations outside Europe each FRA member station counts as one point on 28, 21 and 14 and two points on 7 and 3.5 MHz. OY6FRA and OY6NRA count double points on each band.

Requirements: 20 points.

DTA

1. The award is available to licensed amateurs.
2. Contacts on and after 1st April, 1945 are valid.
3. Do not send QSL cards. A list, showing full details of the contacts should be certified by the Awards Manager of a National Society.
4. The award is issued for all CW or all phone.
5. The fee for the award is 6 IRCs.
6. The address for application is:
   M. Menetrier, F5IN
   128 Avenue de la Resistance
   93340 Le Raincy,
   France.

Requirements: Confirmed contacts are required with THREE of the French Austral countries. There is also an "Excellence" DTA for confirmed contacts with all four countries.

Countries List:

Crozet Islands	FB8W
Kerguelen Islands	FB8X
Adelie Land	FB8Y
St. Paul and New Amsterdam	FB8Z

■

Around the Trade

Alex (Sandy) Bruce-Smith (VK2AD) has joined Dick Smith Electronics Pty. Ltd. as Manager of the Communications Section. He will be responsible for Amateur gear sold by the company.

Sandy has been a licensed Amateur for 18 years and is active on all bands. He has been actively engaged in the sale of communications equipment for the past ten years and was at one time N.S.W. agent for Yaesu Musen. He was formerly with Racal Electronics and has considerable experience in communications used in oil exploration.

Mr. Bruce-Smith is based at the Gore Hill Electronics Centre and Amateurs may contact him there on (02) 439 5311.

Spectrum International have recently added a new filter to the 9.0 MHz line. It is the XF9-NB, a narrow band unit for CW reception (and digital data) with minimum ringing characteristics. Its specs are:

Bandwidth — 500 Hz; No. of Crystals — 8; Ripple — less than 0.5 dB; Insertion — less than 6.5 dB; Terminations — 500 ohms, 30 pF, same as other 9.0 MHz filters; Shape Factor — 6:60 dB 2.2:1, 6:90 dB 4.0:1; Ultimate Attenuation — greater than 90 dB. Price is U.S.$63.95. ■

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- **QTHR means the advertiser's name and address are correct in the current WIA Radio Amateurs Call Book.**
- **The current WIA Callbook is the 1975 edition.**

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Trio 9R59DS Communication Rx and Manual, $120; TCA1677 60 watt carphone, 4 ch and Manual, $100; 10-15V 8A PSU, $45. VK2YCR, QTHR. Ph. (02) 982 3707 (Tony).

Three-Section 100 ft. Guyed Tower plus Ham-M Rotator and 3 el. beam atop. Part of deceased member's estate. Would appreciate offers with assistance to remove. Mrs. Athans, 76 Pascoe St., Burwood, 3125.

AR7 with circuit, $35; **CRO** using 5BP1, with circuit, $30; Multimeter, AVO Mod. 8, Mk3, $80; **Tradipor TE15**, $20; Tape recorder, Robuk, mike and circuit, $30; Microphones with table stands 1-Zephyr, 50 ohm, $15 and 1-Astatic, D104, $10. Have other meters etc. also available. John Sydenham, Ph. (03) 232 4637, any time.

Creed 7 Teleprinter with 3 governors, fibre box cover, PLL decoder, pair MJE340 AS magnet drive, power supplies, $70. Will separate. R. Graham. QTHR. Ph. (02) 642 0122.

Yaesu FT2FB with 1, 4 and 40. As new, $145. Solid state multi-band Rx, covers B/C 30/50, 68/108, 108/170 MHz AC or battery, $25. AWA MR/6A 2FM, restored to new cond., $35. VK3OM, QTHR. Phone (03) 560 9215.

Yaesu FT201, brand new in carton, fitted 12V DC accessory kit, complete with new mike, $500. Matching SP101 speaker, new. Latest Katsumi elec. keyer EK-26 12V DC, 240V AC, little use, $45. 4-Track, 4-Speed solid state Tape Recorder, Type Juli-Corder 999, 12V DC/240V AC, unmarked, as new, $75, including mikes, accessories and 5 new Sony 7" tapes. J. Moyle, VK4ZT, QTHR.

Yaesu FT200 with matching heavy duty power supply, as new condition, $350. Quad 10, 15, 20m, aluminium spider hub, fibreglass spreaders, $100. VK6AZ, 608 Morley Dr., Morley, 6062. Ph. (092) 76 4491.

FT2F FM unit, very good cond., repeater xtals 1, 2 and 4, Simplex A, 40 and 50, $135. K. Roget VK3YQ, QTHR. Ph. (03) 85 3604.

FT101B with matching SP101 speaker, all accessories, $500; VF101B matching remote VFO, $75; Mobile mount for FT101B, $15. All in mint condition, as new. VK3TG, QTHR. Ph. (056) 52 1636.

FT200 Transceiver and Power Supply, 2 years old, as new, little used; microphone and handbook, $350. VK2BZ, QTHR. Ph (047) 53 6149, after hours.

Galaxy 5 with remote VFO mike, speaker and power supply, exc. cond., $370 ONO. Geloso VFO 807 final, 3.5 through 28 MHz, $25. New Anixter Whips, 80 and 40m with bumper ball fitting, $40. VK5ZB, QTHR. Ph. (08) 276 1053.

FT101 Transceiver (no 160 mtr), excellent condition, $350; Sinclair stereo 60 audio pre-ampl., new condition, $18. VK5PV, QTHR. Ph. (08) 381 2415, 382 5851.

New Valves: two 4-125, ea. $9.00; one QY 3-125, $8.00; one QB 3/300, $8.00; one 811A, $5.00; two 5763 ea. $1.00; one QQE 03/12, $2.50; 6HF5s, ea. $4.00; two heavy duty variable cap's, silver plated, good for 4 kV, 20-200 pF and 20-180 pF, 160 x 110 x 85 mm, ea. $7.00; provide postage. VK2BMI, QTHR. Ph. (02) 771 1657.

Gonset GSB100 Tx, mint condition, CW, AM, PM, SSB, VOX, manual, drive any linear, $200. Homebrew Linear on chassis with B&W 1 kW turret, 10-80m, 3 metres, 2 811As, $100. Pair Selsen motors, $20. VTVM Cossor Heath Type, $20. Asahi Mobile Ant., 10-80m with spring, cost $105, sell $75. Tranpro VCT, $40. BC 458A, $20. VK2DA, QTHR. Ph. (02) 94 1039.

Silent Keys

It is with deep regret that we record the passing of—

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A. ATHANS	VK3ACB

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TS500 Transceiver, 80-10m (Trio Kenwood) with 230V PS and speaker, inst. manual included. Used for few months rec. only, $375. May accept FT75B as part payment. G. Down, 3 Broome St., Katanning, 6317.

SR700A/ST700 Star SSB Receiver and Transmitter, with internal power supplies, condition as new, complete with cables, speaker, manuals and circuits. Spare tubes can be supplied at cost if required, $400 ONO. Radio Communication (RSGB), 28 copies (unmarked), from Dec. 72 to April 75, $10 the lot. VK3WQ, QTHR. Ph. (03) 211 5189.

Collins Mechanical Filter Type F455K 31 with Xtals $20. Midland Twin-Meter SWR Bridge, new in box, $16. Communications desk mic. with desk stand $7. New pair stereo phones $10. SP400 Yaesu speaker unit $20. Full set Asahi mobile whips 10 to 80m with ball and spring $65. New, unused 6KD6's x 2 and 6GK6, $16 the set. All above either brand new or mint condition. VK3ARZ,QTHR. Ph. (03) 932 9492 A.H. only.

FT200 AC, PS and Homebrew DC PS. All 10m Xtals plus 11m. Good cond. New 6JS6Cs. No mike. You freight. $350. VK1MP, QTHR.

Tri Band Linear, 80, 40, 20 Mx, 2 x 813, plus 2 spare tubes, home built, with rugged power supply. In large cabinet (3'6" x 2'). Work OK, needs tidying up. $75.00. B. Bathols, VK3UV, QTHR (03) 90 6424.

Stereo Amp, 8 x 8 watt RMS $58. Stereo Amp 16 x 16 watt RMS $89. Labcraft 805 turntable $59 (o.n.o.). VK3ZR, QTHR. Ph. (03) 89 4645.

WANTED

Circuit Diagram and Service Info for Collins front-ends mod. nos. 55D2 and 55B2. These units appear to be ex-Navy and use 6SK7, 6SK7, 6SJ7 valves. VK3ZR, QTHR. Ph. (03) 89 4645.

Cheap Receiver wanted for school boy sitting for novice exam. 3 to 6 command, low band command, AR8 or similar. B. E. White VK2AAB. Ph. (02 467 1428.

Circuit diagram for AVO Valve Characteristic Meter Mark III. Also copy of instruction book, all expenses will be paid. VK3WQ, QTHR. Ph. (03) 211 5189.

Theosophists, or similarly-inclined: Tom House, BA — VK2BTH — would welcome hearing from you. Skeds, preferably CW, eyeball QSOs or correspondence. 34 Wolseley Rd., Lindfield, 2070. Ph. (02) 467 2773.

Crystal Filter 9 MHz for SSB Tx/Rx. Consider other freq. or homebrew. VK7TA, QTHR.

Circuit Diag. of Astor Model TV1 Oscilloscope for copying. Return and postage costs guaranteed. B. Bathols VK3UV, QTHR. Ph. (03) 90 6424.

CRO Single Channel for TV work, around $400.00. Tower, tilt-type, 35 ft. and above. Rotator for quad, e.g. (Stolle or better). Bruce R. Kendall L30578. 10 Carter Cres., Werribee. Ph. (03) 741 2382.

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AMATEUR TRANSCEIVERS, RECEIVERS AND ACCESSORIES

MIDLAND 13-893 23 Channel 27 MHz Transceiver SSB and AM. 12 V DC operation. **$195**

MIDLAND 13-870D 23 Channel 27 MHz AM Transceiver. 5 watts AM. 12 V DC operation. **$99**

PONY CB74A 6 Channel Transceiver. 5 watts AM. P.M.G. approved for 27.880 MHz operation. Fitted with crystals for 27.880 MHz. **$115**

NC310 WALKIE TALKIES. 3 channel 27 MHz, 1 watt operation. Fitted with crystals for 27.240 MHz. **$49.50 each**

LAFAYETTE HA310 WALKIE TALKIES. 27 MHz, 1 watt, 3 channel. Fitted with 27.240 MHz crystals. **$59.50 each**

LAFAYETTE 27 MHz Fibreglass Cowl Mount Mobile Loaded Antenna. 36" long. **$22.95**

27 MHz MARINE ANTENNA designed for installation on fibreglass boats. Does not require any metallic earthing. **$51.50**

HANSEN FS5 COMBINATION SWR. Bridge and power meter. 2 power ranges, 10 and 100 watt. 52 and 75 ohm impedance switching. **$29.50**

¼ WAVE STAINLESS STEEL 11 Metre Antenna with heavy spring steel base and insulator. **$35**

¼ WAVE ROOF MOUNT, mobile 2 metre whip and base with 11 ft. of RG58C7U coax fitted to Belling Lee Base. **$8**

BARLOW-WADLEY XCR-30

a truly portable communications receiver, based on the WADLEY LOOP principle, the same principle as applied in the DELTAHET and RACAL receivers. A truly crystal-controlled highly sensitive multiple-heterodyne portable receiver of exceptional stability with continuous, uninterrupted coverage from 500 kHz to 31MHz.

BARLOW-WADLEY XCR-30 features include: Selectable USB/LSB, CW & AM reception, frequency read-out 10kHz throughout the entire range, calibration accuracy within 5kHz, antenna resonator, tuning signal-strength meter, zero-set control, clarifier-vernier tuning, MHz & kHz tuning controls, telescopic antenna. Power source: 6 type D dry cells: provision for external DC power supply. Weight 9 lbs; size 11½ x 7½ x 4in.

All for $275 F.O.R.

When not in use or for carrying, the top meter/megahertz scale flips down flush with the case and clear of the handle.

NEW POLMAR MODEL UX-1000

27 MHz TRANSCEIVER

Suitable for Novice use. 5 Watt AM, 23 Channels, 12V DC Operation. Has "S" Meter Squelch, A.N.L. and Public Address facility. **$115**

EDGEWISE 0-1 MA METERS. 2½" x ½" face. 3" deep. Calibrated 0-5. **$3 each**

PANEL METERS 5 7/8" x 4¼" with 0-1 MA movement. Various scales on meters.. (Gas Analyser etc.). **$5 each**

NEW QQE06/40 CERAMIC VALVE SOCKETS **$2 each**

MORSE CODE PRACTICE KEYS **$1.50 each**

BATTERY ELIMINATORS to suit transistor radios and cassete recorders, AC-DC 6 volt, 300 MA P.S.6300. **$7.50**

SPEAKER CABLE, colour coded twinflex. **20c yard**

JACKSON SLOW MOTION DRIVES. 6:1 ratio. **$2.30**

CIGARETTE LIGHTER ACCESSORY PLUGS. **45c each, 10 for $4**

MINIATURE SIEMENS RELAYS. 4 sets changeover contacts, 6-12 V DC operation. Type V23154 new. **$3.50 each**

"PHILIPS" TYPE CONCENTRIC TRIMMERS. Threaded stud mounting. 25PF. **75c**

BRAND NEW 4-TRACK STEREO CARTRIDGE PLAYERS. 2.5 watts per channel at 8 ohms. 12 V DC operation. In sealed boxes. **$15 each**

"ZEPHYR" 2K ROCKING ARMATURE MICROPHONES. Desk type with P.T.T. key switch in base. Brand new. **Reduced to $19**

TRANSFORMERS A & R TYPE 5509. Ex equipment but as new. PRI 240 V secondary 2 x 12.6 V at 2.5 AMP. **$8 each**

2N3055 TRANSISTORS **$1 each**

50 OHM COAX. CABLE. 100 yd. rolls, ⅛ in. diameter. **$12 roll**

52 OHM COAX. CABLE. ¼ in. diameter. **45c yd., 50c metre**

DOW KEY COAXIAL RELAYS. 48 volt DC operation. **$15**

3" "N" type connectors to suit **$5 each**

SPLIT STATOR CAPACITORS with screwdriver slot drive 9PF-17PF-25PF. Brand new Eddystone type. **$1.50 each**

EX-ARMY HEADPHONES. Approx. 20 ohms impedance. New in sealed boxes. **$2 each**

2" SQUARE FACE 0-1MA METERS. Calibrated 0-60. **$3 each**

SCOOP PURCHASE

THOUSANDS OF TRANSISTOR RADIO CIRCUIT BOARDS. Ideal for the hobbyist and home constructor.

AM & TRANSISTOR CIRCUIT BOARDS. All new parts. IFs capacitors, resistors etc. **$1.50 each or 3 for $3.50**

LARGE VARIETY OF AM/FM CIRCUIT BOARDS. 10 transistors, Ideal for use as FM tuner, 88-108 MHz. **$2.75 each or 3 for $7**

LARGE QUANTITY OF TRANSISTOR RADIOS in various stages of manufacture. AM and AM/FM models in varios stages of manufacture. Personal shoppers only. **From $2 each**

RF AMPLIFIER AM-4306/GRC

Originally used in conjunction with PRC25 which covers 30-75 MHz FM. Requires 1-4 watts drive and gives a nominal 25 watts out. Brand new in sealed box with complete service and user manuals. **$19 each**

RF SIGNAL GENERATOR **Model TE-20D**

SPECIFICATIONS

Dial has 7 separate band TE-20D covers 120 kHz - 500 MHz.
(6 Fundamental Bands & 1 Harmonic Band)
Freq. Accuracy: +or—2%
Audio Output: to 8 volt
Internal Modulate: 400 Hz approx.
Tube: 12BH7A, 6AR5
Power Source: 105 - 125V, 220 - 240V AC 50/60 Hz, 12 watts.

TE-20D employs a xtal socket and can be used as below:

a.—Self-Calibration. b—Marker Generator
Small size — Space saving.
Printed Circuit for a uniform characteristics.
Dimensions: 140 x 215 x 170 mm. Weight: 2.8 kg.

Price $52.50. P&P $2.00

DISPOSALS EQUIPMENT

Our BULK STORE at 104 HIGHETT ST. is open 9-5 each day for sales of ex-Government Disposals, Electronic Test Equipment, Receivers, Transmitters, Oscilloscopes, Valves, Cable and thousands of those hard to get components and gadgets for the hobbyist. We also open 9-12 p.m. Saturdays. **Telephone 42-6136.**

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